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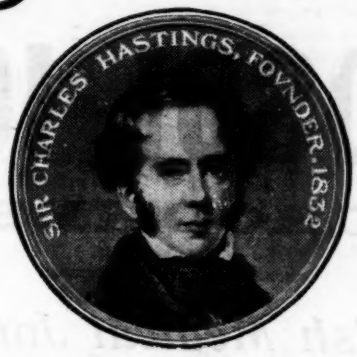

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A British Medical Association Lecture

ON

SOME PITFALLS IN THE DIAGNOSIS AND TREATMENT OF PULMONARY TUBERCULOSIS.*

BY

CLIVE RIVIERE, M.D.LOND., F.R.C.P.,

PHYSICIAN, CITY OF LONDON HOSPITAL FOR DISEASES OF THE HEART AND LUNGS, AND SHADWELL CHILDREN'S HOSPITAL.

HAVING been offered the wide subject-matter of pulmonary tuberculosis for my lecture, it has seemed to me that the best I can do is to concentrate on certain matters which are, in my opinion, of primary practical importance. These, almost of necessity, come within the two headings "Diagnosis" and "Treatment," and we naturally begin with the former. I do not propose to waste time over ordinary points of diagnosis, important though these may be; I am anxious instead to face some special pitfalls which await us, not in the ordinary straightforward case, but in the exceptional case which—paradoxical as it seems—is really the commonest one to meet us in private practice. Most serious among these is the case which develops and progresses without physical signs, or without such physical signs as any self-respecting case of pulmonary tuberculosis ought to present—in other words, the case which is *not* a case of apical phthisis. Let us start with this.

The Example of Childhood Tuberculosis.

It has been my good fortune to be physician to a large children's hospital, and, taking always a great interest in lung disease, to have had much experience of pulmonary tuberculosis as it affects the child. In early life, as you know, a primary lung focus gives rise to secondary infection of glands, and from these the lung is again infected in a case where disease progresses further. Nearly always immunity has by this time reached a high level, the lung infection is a slight one and confined to the neighbourhood of the roots and larger bronchi, and life is in no wise threatened. Here and there we find a case where from early age or other reason immunity fails, and disease spreads outwards, showing itself in the radiogram first as mottling round both roots, later involving a larger and larger area of lung, till, in late stages, it appears to reach out to the periphery. This is the condition, whether slight or serious, which we speak of as hilus tuberculosis, or glandular and hilus tuberculosis. However the spread is accomplished, it has begun deep in the lung, and has only at a late stage reached the periphery over which our stethoscope is hovering.

What, then, is the clinical aspect of tuberculosis in childhood? A child is brought to you with symptoms suggestive of tuberculosis—what do you find on examination? If you examine carefully you will find in practically all cases that the percussion note is slightly against the right lung both front and back, and that there is a right paravertebral dullness disposed as a semicircular area against the spine. You may also find an increase of parasternal dullness, blowing breath sounds over the upper vertebral spines, and various other signs; but what you do *not* find (except in advanced stages of disease) is the presence of crepitations. Indeed, the stethoscope may tell you nothing at all, and this is, in my experience, the rule. Do you therefore say there is no disease of the lungs? Not if you have learnt wisdom from experience. No; having found the signs referred to above you may say with confidence, "This is a case of glandular or hilus tuberculosis," but you cannot tell in the least from physical signs whether the disease is of no account and healing or healed, or whether both lungs are half filled with active bronchopneumonic tubercle. The physical signs are the same or similar in both cases, and the really vital part of the diagnosis has to be deduced from symptoms and the amount of illness, helped—and greatly helped in many cases—by the study of a radiogram.

And here let me digress for a moment to say a word about that radiogram in childhood. In infancy and up to the age of 5 years or so the lung picture is pretty clean in the healthy child, and a superadded tuberculosis or bronchopneumonia or suchlike is very clear and apparent. But the radiogram of a child of school age—especially from 8 or 9 years upward—is already greatly shadowed with past sins, whether in the shape of silicosis, or of healed tubercle, and other chest infections, and it requires a lot of experience to interpret it correctly in a case of doubtful tuberculosis. In slight and recoverable disease, such as we have mentioned, often it can only be said that the radiogram is "consistent" with a slight active tuberculous lesion. Fortunately in the more serious cases the radiogram is reliable—really active tubercle round the hilus throws shadows which are hardly mistakable, and the *x* rays are very valuable in following the course of the disease.

Deep Lung Tuberculosis in the Adult.

Now I have lingered so long over hilus tuberculosis of the child because it illustrates what I have to say of the adult. The child is father to the man, and no small proportion of the tuberculous outbreaks of early adult life (and even in later years) are a spread from these deep areas round the roots of the lungs. Hilus tuberculosis, which is the rule in the child, is also by no means uncommon in the adult. Just as in the child, there is nothing discoverable to the stethoscope, and, as the stethoscope is still the instrument of choice with most physicians, nothing may be found in these cases to suggest a diagnosis of pulmonary disease.

What happens to an adult who develops deep-seated or hilus tuberculosis? Let us hope, for his sake, that he coughs, for otherwise his chances of recognition are small. Unfortunately it is by no means uncommon for such cases to cough but little in the earlier stages, or to take small heed of it, and the main symptoms complained of are often those of neurasthenia—it is, indeed, a neurasthenia, but of toxic origin! Many of these cases, in my experience, have been given rest cures as frank neurasthenia at the outset, and if a careful temperature chart were taken in the nursing home and duly studied this might, indeed, be a step of value. But often in these cases the temperature is not such as to lead to suspicion, and having received the neurasthenic label they are very apt to go further on this journey. It has been my experience of recent years to be asked by a distinguished neurologist to exclude tuberculosis in cases of neurasthenia, so the lesson of these cases has evidently been learnt in high places.

How can we escape the pitfall of deep-seated or hilus tuberculosis simulating other conditions, and especially neurasthenia? First, and especially, by recognizing its possibility, and using means to exclude or confirm it. Among these are a careful temperature chart, *x* rays, which help but do not always decide the matter, and the search for certain physical signs, among which narrowing of the apical resonance (Krönig's) on both sides—for disease is generally double—is important evidence. Suspicion is the first stage on the road to diagnosis, and full recognition of the fact that a lung may be full of deep disease without giving any definite physical signs at the surface. Recognize frankly that your stethoscope may be as useless in these cases as if you applied it to the wall of the patient's house! Develop your powers of percussion, and do not despise the help of the radiologist.

In these days, when the value of artificial pneumothorax is beginning to gain recognition in this country, it is quite common to be presented with a case in which the stethoscope finds moist crepitations over the whole of one side, and the other side appears to be entirely clear. In such cases when a radiogram is taken it may often be found that disease is active and advanced on both sides, although the stethoscope could only find it on one. The spread on one side is only a bit more advanced than the other, and has reached the surface; presently, in weeks or months, crepitations will appear on the apparently clear side and rapidly spread over the surface. These cases, in fact, present a somewhat different aspect of the same diagnostic

*Delivered before the Hastings Division of the British Medical Association.

pitfa. —namely, deep-seated disease without surface evidenc.. Many years ago, when I first started doing artificial pneumothorax, I had no *x*-ray installation at my hospital on which to rely for help. In one case in particular I remember collapsing a very bad lung where the other lung appeared to be clear, with the result that oedema developed in the apparently clear side and the patient died. At the autopsy it was painfully disclosed to me that the "better lung" was full of deep excavation and abundant disease, none of which gave signs at the surface. At the time this came to me as somewhat of a shock, but experience has taught me that it was an excusable accident. Given advanced hilus tuberculosis and one-sided signs, it is practically impossible to tell from physical signs what may be happening in the depths of the other lung. On the other hand, with symptoms which may or may not be due to tuberculosis, and with absence of stethoscopic signs, it is fortunately quite possible to exclude or confirm hilus tuberculosis—that is, we can diagnose the disease, but details as to its distribution in the depths of the lung are quite another matter.

What I want to emphasize in the matters I have discussed is the pitfall which deep-seated tuberculosis presents to the unwary. Fortunately this form of the disease is often of mild aspect, and a holiday rest and some attention to health may get the patient well, undiagnosed. But this is by no means always the sequel, and if you wish to catch your case early, and to avoid the risk of hearing that your favourite "neurasthenic" has died of tuberculosis, you must keep this pitfall in mind. Never be put off by absence of stethoscopic signs; this means nothing. Take the symptoms seriously until it can be clearly demonstrated what is their cause, or at least that it is not tuberculosis. My experience is that it is deep-seated disease which especially provides advanced cases and swells the mortality table in tuberculosis, and this solely, I think, because the condition remains undiagnosed and hence untreated in its earlier stages. Undoubtedly the disease may spread slowly with but slight disturbance of health, and only after years may it be recognized, too late, that the patient's resistance is finally overcome.

Deceptive Signs.

And now I will turn to a quite opposite aspect of tuberculosis, with the object of reminding you that stethoscopic signs, on which we physicians are very apt to rely, may also deceive us at the other end of the scale—that is, that in cases of tuberculosis crepitations do not always indicate active disease. Many are my patients, or former patients, going about their ordinary avocations with an area of crepitations over the site of their most advanced lesions. For the most part such cases harbour a deep cavity, but this is not always the case. The condition is generally due, in my opinion, to a dilatation of small bronchi or bronchioles—a bronchiolectasis—brought about by the contraction of underlying or surrounding tissues. Often the sound is a dry crackle, but at other times, particularly in conditions of catarrh or after a haemoptysis, moist crepitations may be heard. Such signs are very apt to be taken for those of active disease—indeed, good observers may differ as to their significance in a given case. Particularly difficult is it to exclude activity, or to persuade others that tuberculous activity is absent, in cases of haemoptysis or of fever in such cases. Nevertheless a prolonged experience of tuberculosis has convinced me that in cases of long standing, and where disease has reached to stages of cavitation, haemoptysis, febrile attacks, and moist crepitations may all be found in the entire absence of tuberculous activity. Not a few of such cases have recurrent attacks of haemoptysis without further disturbance. The febrile attacks are due to secondary infections and are often periodic, sometimes recurring to a day every three or four weeks. If such a case, being known as tuberculosis, has retained crepitations over a large area of one lung, it may be difficult to decide and difficult to persuade others that, *qua* tuberculosis, the condition is arrested. Where, moreover, disease has been widespread, it must be admitted that it is unwise to rely too much on such arrest where secondary infections are constantly disturbing the balance.

Another sign of tuberculosis which may persist in an embarrassing way long after the disease is in abeyance is the presence of sputum containing the tubercle bacillus. Patients are known to me who have been well and at work for periods up to eight years at least with no relapse, but with tubercle bacilli still present. I suppose in such cases there exists an unhealed sinus leading to a caseous area at some spot. Truly in tuberculosis things are not always what they seem, but it was especially the possibility of crepitations without activity to which I wished to direct your attention. Do not, however, bank too much on this possibility in individual cases, or they may let you down.

The Stethoscope as a Pitfall.

Now I have taken two pitfalls in the diagnosis of tuberculosis and its activity, both directed towards warning you against too great reliance on the stethoscope as opposed to other means of diagnosis. The stethoscope is a valuable instrument, so long as there are no holes in the rubber, no wax in the meatus, and no prejudice in the mind of the user, but it is not, or should not be, the alpha and omega in the diagnosis of pulmonary tuberculosis. It may, as I have pointed out, "omit to mention," and it may even deliberately lie. I do not, on this account, recommend its abolition, for in the hands of those who fully grasp the situation its silence will not deceive, and its lying, like most lying, will not sound quite like the truth. But it should be put in its due place as one only of the sources of information as to what is happening in the organs of the chest.

TREATMENT.

Dangers to the Early Case.

I will now turn to the subject of treatment, and the point which above all others I wish to stress is the harm which the patient may do himself during the stage when he is awaiting a definite diagnosis, or at any rate awaiting treatment. The wise practitioner will confine his patient to his home or even his room where he suspects tuberculosis but has not yet confirmed his suspicion. This may be done on the excuse of a rest temperature chart, and if this shows fever the patient should be kept to bed or couch. I am convinced that the active stage could be vastly shortened, with the result that disease would spread less far and recovery be more complete, if cases were treated thus for acute illness, as indeed it is, at the immediate outset. What, instead, happens as a rule? The patient goes about his occupation for weeks or months after definite symptoms have commenced, and thereby greatly prejudices his chances of recovery. This is often, of course, the fault of the patient alone—he may never have visited his doctor during these early stages, or he may refuse to follow advice. But such advice must be insistent, and pressed with real conviction, and with the force of massed medical opinion behind it. All those who speak with authority are at one on this need of rest at the outset, only they do not speak loudly enough. The cry is for early diagnosis, and rightly enough; but the doctor who has started precautionary treatment before he can deliver his diagnosis has gone one better, and has earned, even if he does not get paid, the real gratitude of his patient. If a mistake has been made his conscience will be easy—he has done the right thing, and whatever was wrong with the patient other than tuberculosis the rest was probably beneficial.

When the case has been diagnosed start a resting régime right away; remember that the case came to you for "symptoms," and these mean active disease whether there is fever or not, and active tuberculosis, like any other active inflammation, needs, above all things, rest.

The lung is a difficult organ to rest, but its movement can be curtailed by bodily rest and absence of talking, and its blood supply lowered by damping down the systemic circulation with which it is in continuity.

The Therapeutics of Rest and Exercise.

Let us inquire a little into the rationale of rest, and incidentally of exercise, in the treatment of pulmonary tuberculosis.

Said Hermann Weber once in days gone by, "I would not willingly undertake to treat a case of phthisis without the help of exercise," to which Penzoldt retorted, "I would not willingly undertake to treat a case of phthisis without rest, keeping exercise as an exceptional measure." Whereupon Dettweiler settled the dispute with the remark, "The truth lies really in the proper application of both measures to suitable cases, though rest is, to my seeing, the primary factor." The key to success lay, he opined, in the "correct dosing of rest and exercise," and that is much where the matter remains to-day.

Theory and experiment have, however, come to the assistance of empiricism, and have provided a working basis—the blessed word "auto-inoculation" has filled our minds with peace, and our mouths with a plausible explanation of many perplexing problems. Almroth Wright revealed to us the great game of "antigen" and "antibody"; he showed us how the resisting power of the body to chronic infections depends on a proper balance between them, how a suitable supply of bacterial products (antigen) is needed to produce an immunizing response (production of antibody), and how excessive and uncontrolled dosage may overcome antibody formation, with the result that symptoms appear and disease spreads; how, further, once the balance is disturbed it can only be recovered by control of the bacterial toxins let loose (control of auto-inoculation) by rest and similar measures. At a later stage there may be brought about a gradual training of the body to resist larger and larger doses (tolerance), while at the same time "immune reactions" are developing to every adequate dose of exercise. For auto-inoculation may follow upon "all active and passive movements which affect the focus of infection, and upon all vascular changes which activate the lymph stream in such a focus." Here is our working hypothesis, and it has been to the work of Paterson and Inman in particular that we owe its full application to the case of pulmonary tuberculosis. The rôle of rest and exercise in its treatment resolves itself, in the words of Paterson, into two aims:

1. "Control of auto-inoculations when the protective substances are unable to deal with them."
2. "The artificial inducement of auto-inoculation adjusted to the resisting power of the protective substances."

It is, of course, the former alone which applies to the newly discovered or still half-diagnosed case—it is a case with symptoms, and these are evidence of a breakdown of immunity which only rest can straighten.

The Rationale of Rest.

The main reason for rest is fever—it provides "control of auto-inoculations when the protective substances are unable to deal with them," and enables us to reach eventually a fresh formation of antibodies. Not only does uncontrolled dosage with antigen defeat the formation of antibodies, it also acts deleteriously by "activating" all tuberculous lesions within reach of the blood stream. Just as an overdose of tuberculin will let loose "focal reactions" in company with a "general" or febrile reaction, so is fever in tuberculosis accompanied by a disastrous flooding of the tuberculous areas with blood deficient in antibodies, and a further washing out of toxins and waste products into the blood stream. This leads to further fever, and thus a vicious circle is kept up, which can be broken only by rest, unstinted and sufficient.

But a further task awaits the tissues in the erection of "fortifications" round the areas of disease with a view to their encapsulation, and this, again, requires a period of rest after all fever has subsided. It has been shown that the injection of a chemical irritant into the lung excites the formation of inflammatory zones whose nature varies with the concentration of the irritant—thus a central necrosis, then a fibrinous layer, next serous inflammation, and lastly, around all, a zone of proliferating fibrous tissue. A similar process occurs in response to the toxins of the tubercle bacillus. When the parts are at rest a zone of fibrous tissue will form at the spot of "optimum irritation," and good encapsulation ensue. If much movement is allowed there will be no fixed optimum, and a wider spread of less well developed fibrous tissue instead of a limiting capsule. In addition to this it may be further expected that immobilization acts by reducing the lymph flow to the diseased area and thereby diminishing the introduction of nutriment and the extraction of waste products till the growth of bacilli and the formation of toxins cease.

In connexion with this argument, and perhaps with those to come, it is but fair to point out that immobilization of the lung acts as a two-edged sword in its application to tuberculosis. While collapse and immobility of the organ are, on the whole, unfavourable to the development of tuberculosis, there is a phase of expansion and movement between this and complete activity which is very favourable to the development of tubercle. This shows itself in the more rapid growth of tubercles in the apical regions of the lungs than in the more greatly aerated basal areas in cases of miliary tuberculosis where we know all tubercles are of equal age.

As a matter of experience it appears that the control of auto-inoculation is of vastly more importance than any accidents of extension or movement in portions of lung tissue, and it is primarily to this that our therapeutic rest should be applied.

Nevertheless, on the mechanical side there seem to be two other arguments in favour of rest while disease is still active. One is the increased movement and extension, the result of exercise of an organ doomed of necessity to some amount of this. It must be difficult enough for a wound or inflammatory area to heal under the peculiar conditions of elastic tension and continual movement always present in the lung. If these are increased by talking and exercise it must necessarily make the process still more difficult. The other point is the peculiarity of the pulmonary blood supply which puts it at the mercy of the systemic circulation. Provided with but little vasomotor control, with no power of stopcock action such as obtains in the greater circulation, the lungs are doomed to pass through, with no protection of diseased areas unless by mechanical blockage, whatever mass of blood the systemic circulation sets in motion. Especially does muscular activity increase this circulation, and a patient moving about is all the time flushing his inflamed lung areas with blood. This may not lead to fever (the patient may have developed "tolerance"), but even apart from this such intermittent flushings are not the best treatment of tuberculous areas as long as these are active. This, in my opinion, is one of the pitfalls in treatment: the belief, commonly held, that exercise is harmless so long as it does not cause fever—that is, so long as there is "tolerance."

Now it is especially where large areas of exudative inflammation exist—that is, in cases of fairly acute type—that flushing and movement very certainly do harm. We are familiar with the softening and discharging of caseous cervical glands where heat and unrestricted movements are applied. In the neck this may shorten the cure, but in the lung it means "cavitation," a disastrous method of removing diseased material since the tissues kept at tension cannot close the breach. Hence for all cases of active disease tending to the formation of areas of bronchopneumonia or exudation which may become caseous and soften, prolonged rest is surely indicated. But it must also be remembered that in every tuberculous lung such areas on a smaller scale are present; Dettweiler has compared it to a mulberry tree on which are found at the same time flowers, and fruit both green, red, and black together—in the tuberculous lung we may have areas of fibrosis and softening near together, and also all stages of inflammation, exudation, bronchopneumonia, formative processes, etc., in the same organ. This mixed process must be borne in mind in treatment. But what must also be specially kept in view in relation to this is the fact that absence of fever is not evidence that disease has become inactive. The physical signs clearly indicate that activity is still present, and only slowly abating, for months after rest in bed has reduced fever and symptoms to a minimum. Such patients *can* be got up and tolerance established, but as long as disease is active, if it is of any extent or seriousness (and it needs much skill to know what cases are not) there is no

doubt that movement and intermittent flushing with blood are the wrong treatment for them. We have taken as our text disease but recently, or even incompletely, diagnosed, but it must not be supposed that all such cases are really "early," or that disease may not already be of a serious nature at the moment of its discovery. If it is deep-seated, especially, it may already be extensive.

There still remains a further reason for rest at the beginning of the illness called pulmonary tuberculosis—namely, the need of the body for its physical recuperation. "It needs a given amount of energy," remarks Joslin, "to meet the demands of ordinary metabolism; it requires an extra amount to meet the extra demands made by a disease like tuberculosis; and it requires still more to fight the infection and bring about a healing." Pottenger says, "The disease-fighting power of a patient will depend on his ability to maintain an excess of energy after meeting the natural metabolic requirements of the body," and for this adequate rest is required.

Practical Considerations.

And now what does all this "boil down to," to use a colloquial phrase? That pulmonary tuberculosis, and the suspected case also, should be treated as a serious matter unless, or until, it can be shown to be otherwise. That bed, or at least rest on a couch, is the right place for it at the outset, and pending complete diagnosis, and that this should be continued as long as, and beyond, the period of active symptoms. Especially must the patient be prevented, where possible, from "settling up his affairs," which means, in many cases, a strenuous attempt to put several weeks' business into a few fevered days. If it is put to him frankly that this may mean a serious prolongation of his illness, or worse, it often becomes apparent that this "settling up" is not so indispensable as it at first appeared, and a relative or friend can be deputed to carry it through. In cases where fever is a prominent symptom—cases, therefore, which will probably require the training of a sanatorium course—it is necessary to carry on bed treatment for a considerable period. If the conditions are suitable this early rest period can sometimes be advantageously carried on at home, if the friends can be trusted, or a reliable nurse is obtainable. Sanatoriums do not provide for many bed cases, and therefore it is convenient to get through a good part of this period before the patient is sent. There is also this to take into consideration—that in institutions for the treatment of pulmonary tuberculosis, whatever class they serve, there must always be a bias towards getting their patients up and about, and pushing onwards towards convalescence. Convenience, economic forces, and generally the patient's desires all push in this direction, and whatever the doctor's views may be they are likely to get carried in this direction also. The tendency is to curtail the initial resting period.

And now I feel you will be mentally asking what I consider this period of rest should run to. And this I find very difficult to answer in general terms—it is so very much a question for individual consideration. For cases running fever one may perhaps say *double* the febrile period, but in no such cases should the resting period be shorter than a couple of months. In cases of slight exacerbation in an old tuberculous case the resting period may often be more curtailed than in a first attack. With disease of decided amount and activity a period of four to six months' rest is none too long; and for the hospital class, in particular, owing to their ignorance of the dangers, and inability to obtain frequent medical observation, a long resting period at the outset is most vital. It is to be presumed, though I have not mentioned it, that the maximum of open air is combined with this rest in all cases. Rest may be in bed (and should be in febrile cases) beside the open window (preferably with the sashes removed), or on a balcony, or in many cases divided between bed and an outside couch (but stairs must not be allowed). A matter worth mentioning with regard to rest treatment is that the patient's "tolerance" to auto-tuberculin is apt to fall low during prolonged rest, so that but slight causes may lead to rises of temperature. This can generally be ignored, and "tolerance" can be readily built up again when it is decided that rest has been carried far enough.

When the bed period has been carried through, then will begin the period where constant attention, resource, and knowledge are most necessary—namely, the period of graduated movement and re-establishment of tolerance. This time, in cases of any seriousness, is most safely carried through in a sanatorium, where daily supervision is possible, and where conditions and surroundings are arranged to facilitate this end. Where rest has been carried on till disease is really quiescent, then the period of graduated convalescence can be carried through with more confidence and safety.

Pratt's Class Method.

At the conclusion I might add a few words on the most modern application of rest—namely, what is known as "Pratt's class method" of treatment, practised with success among the tuberculous poor of Boston, and also since in Montreal and elsewhere. The patient is put to bed in his own home under the maximum of open air allowable, and remains there for several months. He is visited at regular intervals by a visitor, generally a nurse, records are kept of his progress, and when it is considered safe for him he attends once weekly at a centre or "class," where he is seen by the doctor, weighed, and the names of those who have gained most weight, and those who have spent longest in the open air, are chalked up on a board. The patients chat among themselves and are given a short "talk" by the doctor, and then return to their beds. Each class is limited to twenty-five, and competition among them in the battle for health becomes very keen. Adami noted that in Montreal these patients gained twice as much weight as did similar cases treated in a sanatorium under more rural conditions. The average bed rest among Pratt's cases was four months, of "graduated exercise" combined with bed rest four to seven months, and the whole treatment ran up to a year and sometimes longer. When we remember that recovery from tuberculosis must take at least a year and often two or three years, according to what hold it has been allowed to get at the outset, it will be seen that this is not over long for treatment.

And now what were the results? Comparing them to those of Frimley and of Midhurst Sanatoriums in this country, they may be stated as follows:

Years after Discharge.	Frimley (at Work).	Midhurst (Well or Alive).	Pratt (at Work).
1	61 per cent.	69 per cent.	95 per cent.
5	39 "	39 "	71 "
10	—	35 "	50 "

These are striking figures, and though Pratt's cases (though unselected and all positive to tubercle bacilli) amount to but 191, and hence are over small for statistical valuation, still the superiority seems too marked to be accidental. If this claim is substantiated, and I see no reason to doubt that it will be, there seems little doubt of where the secret of success lies—namely, in the institution of rest at the outset. These patients went to bed when otherwise they would have been walking about, and perhaps trying to work, and they remained in bed over the dangerous period of active disease. It is as an illustration of this point that I have introduced this system and these figures to your notice at the end of this talk, and it is on this note that I should like to finish. Let tuberculosis be treated, however mild the symptoms, as an acute illness at the outset, and I feel sure we shall notably reduce its mortality. Do not wait for the diagnosis to be established; especially do not wait for tubercle bacilli, which can never be trusted to keep an appointment; do not wait for such further investigations as the diagnosis may necessitate; do it now, as the advertisers say! Put your patient at rest and keep him there till your suspicions are confirmed or otherwise, and you can greet him hereafter with an easy conscience in the Elysian fields.

COMPLEMENT FIXATION IN TUBERCULOSIS: *A CRITICAL SURVEY.*

BY

A. LISLE PUNCH, M.B.LOND., M.R.C.P.LOND.,
ASSISTANT PHYSICIAN, BROMPTON HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST; PHYSICIAN TO OUT-PATIENTS, ROYAL NORTHERN HOSPITAL;

AND

A. HOPE GOSSE, M.D.CANTAB., F.R.C.P.LOND.,
PHYSICIAN, BROMPTON HOSPITAL FOR CONSUMPTION AND DISEASES OF THE CHEST; PHYSICIAN TO OUT-PATIENTS, ST. MARY'S HOSPITAL.

EVER since Wassermann and Bruck demonstrated in 1906 the presence in the serum of tuberculous animals of substances capable of fixing complement in the presence of tubercle bacilli a vast amount of work has been done in an endeavour to make use of this fact to obtain a reliable biological test for tuberculosis in human beings.

The present authors have for the last two and a half years been investigating the reliability of a method of performing the complement fixation test for tuberculosis derised by one of us (A. L. P.) as a means of diagnosis and exclusion of pulmonary tuberculosis.

The results upon which we originally formed our opinion that "a positive result is an indication of an active tuberculous lesion in the body, and that a negative result is a reliable indication, with a few rare exceptions to which we shall refer later, of the absence of such lesion" are briefly as follows.

In all, the test was performed in approximately 1,000 pulmonary cases and controls. Of these some 160 were definite cases of pulmonary tuberculosis, the criterion for a definite case being the undoubted presence of tubercle bacilli in the sputum. All save 5 of these gave a positive result. Of the 5 that gave a negative result 3 subsequently gave a positive.

Some 140 presumably healthy people or patients suffering from non-tuberculous diseases were taken as negative controls. Three gave a positive result. Of these 3, in one definite evidence of enlarged presumably tuberculous glands in the neck was subsequently discovered, in another on more careful examination it was impossible definitely to exclude a tuberculous lesion in the lungs, while in the third no evidence of tuberculosis could be discovered. Of the remaining 700 cases some 220 gave a positive result and some 480 gave a negative. These were doubtful cases clinically, so that no definite conclusion could be drawn from them. All that could be said at the time without later investigation was that there seemed to be a reasonable correspondence between the clinical condition on the one hand and the negative or positive result on the other.

The subsequent history of 50 of the cases which were suspicious of pulmonary tuberculosis, but which gave a negative reaction, was then investigated. After the lapse of from ten to twenty months 49 of them showed no further evidence of tuberculous infection. The one exception was a man who was living for a year subsequent to his first examination with a brother suffering from consumption, and it is reasonable to suggest that he became infected while under observation. In the 49 cases the test was negative at the second as well as the first examination.

Finally, we investigated the subsequent histories of 50 cases in which the complement fixation test was positive but in which tubercle bacilli had never been found in the sputum, as far as we were able to determine, prior to the examination of the blood. These were unselected cases and were consecutive as far as the above conditions of a previous absence of tubercle bacilli in the sputum and a positive test were concerned.

Of the 50 cases a reply was received from relatives that 8 had died. In 3 tubercle bacilli had been found in the sputum. Of the remaining 42 cases, 29 attended for re-examination. Ten failed to reply, and 3 replied but were unable to attend. No less than 13 out of these 29 cases had been proved definitely tuberculous between the first and second examinations by the finding of tubercle bacilli in their sputa. An analysis of the 16 as yet unproved cases showed that 5 were cases of pleurisy when first examined; in 3 no sputum was available; in 8 there were still symptoms and in some further physical signs were present. In 2 there were no symptoms at the second examination.

Since this work was done the test has been carried out in a large number of cases amounting in all to some 2,500. The results of these have fully confirmed our opinion as to the value of the test.

Since 1906 the amount of work done on this subject has been very large and the publications are very numerous. The results have been somewhat variable.

In scientific investigations of this description, as the number of workers increase and the publications multiply and conflicting views are expressed, there is perhaps a tendency for the salient points to be lost sight of and become obscured in a fog of side-issues.

The object of this paper is twofold: (1) By a study of the literature on the subject to determine what, if any, definite advance in knowledge has been made on the subject since 1906—that is to say, what points of agreement have been arrived at by the various workers, and to determine if possible the causes of their points of disagreement. (2) To determine whether the method which we have employed of performing the test might reasonably be expected in the light of ascertained facts to give the reliable results we have obtained.

VARIABILITY OF RESULTS DUE TO EMPLOYMENT OF DIFFERENT ANTIGENS.

There can, we think, be little doubt that the variability of the results obtained can be partially explained by the variety of the antigens used.

Miller[1] has classified the antigens used into four main groups:

1. Suspensions of whole or ground-up tubercle bacilli.
2. Antigens that may be classed as tuberculins.
3. Extracts of derivatives of tubercle bacilli.
4. Extracts of normal or tuberculous tissues.

Has any uniformity of opinion been arrived at as to the relative value of these four groups of antigens? We think we can say without fear of contradiction that antigens belonging to Group 4 are useless as antigens for this test. The relative value of the three other groups of antigens remains to be considered.

This article does not pretend to be a complete review of all the literature upon the subject, but merely aims at indicating the conclusions we have arrived at after a perusal of much of it, so that no attempt will be made to give anything like a complete list of all the workers and their results. We shall be content here to give our conclusions with reference to the work of others which appears to us to be illustrative of the bulk of the work in this field of investigation.

Group 1.

It would appear to us that generally the most reliable results have been obtained with antigens belonging to this group. It is antigen of this type—that is to say, a dilute emulsion of living tubercle bacilli—that we have used in our investigation. It is especially in relation to their specificity that antigens of this type appear to be superior.

Dudgeon, Meek, and Weir,[2] using an antigen belonging to this group, obtained 86 positive results out of 102 "definite cases of pulmonary tuberculosis." But of the 16 cases that gave a negative result, in 4 tubercle bacilli were said to have been present in the sputum two months previously, but were not present at the time the test was performed, and no symptoms or physical signs of pulmonary disease were present. One was a case of old tuberculous leprosy, one was diagnosed by a febrile reaction only. In 2 physical signs and symptoms of pulmonary disease were present, but no tubercle bacilli were present in the sputum. One was in a moribund condition. In 7 tubercle bacilli were present in the sputum. So that excluding the case that was moribund, only 7 could be said definitely to be suffering from pulmonary tuberculosis at the time the test was performed.

McIntosh and Fildes,[3] using an emulsion of living tubercle bacilli as antigen, obtained 76 per cent. of positive

results in definite cases of pulmonary tuberculosis. Of 82 controls, all were negative save 3. Of these 3, 2 were cases of leprosy. (We might mention in parenthesis that we have also found cases of leprosy giving a positive result with tuberculous antigen; one was a case of Addison's disease and was therefore in all probability suffering from an active tuberculous lesion.) Miller,[4] using an antigen made by grinding up tubercle bacilli with salt, obtained a very high percentage of positive results (96.8 per cent.) in cases with tubercle bacilli in the sputum, while of 243 Wassermann positive serums, 7 only gave fixation of complement with tuberculous antigens; of these a diagnosis of tuberculosis was subsequently established in 5 and could not be excluded in the remaining 2.

Moon,[5] using Miller's antigen, found that 85 per cent. of cases diagnosed clinically as tuberculosis gave a positive result, although 38 out of 100 Wassermann positive serums gave a positive reaction with his tuberculous antigen.

Other workers using antigens of this group have obtained similar results.

Group 2.

The best known of these antigens is Besredka's antigen. He has obtained a high percentage of positive results in definite cases of tuberculosis. But many other workers, including Inman,[6] Debains and Jupille,[7] and Bronfenbrenner,[8] have brought forward evidence to show that this antigen is not specific in that Wassermann positive serums may give a positive reaction when tested with this antigen. The work of the last named is of special interest.

It is well known that the complement-fixing substance in syphilitic serums is not an antibody specific to the spirochaete but a lipotropic substance, and this lipotropic substance may bind complement in the presence of lipoidal substances present in tubercle bacilli. Moreover, the addition of alcohol and other substances to tubercle bacilli may intensify this non-specific lipoidal action of tubercle bacilli.

Bronfenbrenner's experiments are complicated, but they appear to prove that the complement-binding substances present in tuberculous serums are specific antibodies to tubercle bacilli, and not lipotropic in character. In cases where a double infection with the *Spirochaeta pallida* and the tubercle bacillus was present he appears to have been able to demonstrate the presence in the serum of both the lipotropic substances due to the spirochaetal infection and also the specific antibodies to the tubercle bacillus.

In view of these facts it appears to us that a dilute suspension of tubercle bacilli in saline is undoubtedly the best antigen for this test. In such an antigen the lipoidal substances are not present in a sufficient amount to cause any fixing of complement in the presence of lipotropic substances, nor is there any alcohol or other substance added which would intensify this non-specific action. Another and very great advantage that it would appear to us that this antigen possesses lies in the fact that it is not to any appreciable extent anticomplementary. There can be very little doubt that many of the false positives that some workers have obtained have been obtained owing to their antigen giving rise to non-specific summation effects in virtue of slight anticomplementary properties.

Group 3.

Different workers have used various extracts and derivatives of tubercle bacilli as antigens. Calmette and Massol[9] have used water and peptone soluble preparations. Corper[10] used tubercle bacilli autolysed for ten days at incubation temperature in salt solution; Dudgeon, Meek, and Weir,[11] an alcoholic extract of tubercle bacilli; Wang and Crocket[12] tubercle bacilli heated with alcohol, ether, and chloroform; Wilson[13] an alcohol and ether extract dried and suspended in saline.

The remarks that we have made with regard to Group 2 apply with equal force to this group.

Causes of Differences Obtained by Different Workers using the Same Antigen.

The varying results obtained by different workers using different antigens is no doubt due in part to the difference of the antigen. The differences obtained by various workers using the same antigen do not at first sight seem easy to explain. But a little consideration will, we think, show certain possible contributory causes.

1. In the first place, and especially in regard to antigens of Groups 2 and 3, it appears to us that the description of the methods of their preparation are often wanting in details, and are frequently impossible of constant preparation, so that it is often impossible to be certain that one is using exactly the same antigen as that employed by the author whose technique one is endeavouring to follow.

2. In their publications many authors do not give a detailed description of the technique they have employed. They mention the antigen they have used, but they do not give in detail any quantitative data of the other reagents used in the test. Now Dean[14] has pointed out that there is a definite favourable quantitative relationship between antigen, antibody, and complement. It is not surprising, therefore, that variable results have been obtained by various workers if the technique is not adhered to in every detail.

3. A third manner in which differences of opinion as to the exact reliability of the test may arise is through incomplete control of the cases on the clinical side and through the employment of incomplete and inaccurate classifications of the cases. In all our cases we have investigated, as far as lay in our power, most carefully the clinical aspect of the patients, and we feel that part of the success in the results we have obtained has been due to this very careful clinical control. As an instance of what we mean, Stoll and Newman,[15] using Wilson's antigen, state that 58 per cent. only of cases of definite pulmonary tuberculosis gave a positive result. But among their cases of definite pulmonary tuberculosis they include a considerable number of cases without tubercle bacilli in their sputum. Now, for the purpose of controlling a test for pulmonary tuberculosis the only definite criterion for a case of phthisis should be the presence of tubercle bacilli in the sputum, for there is no combination of symptoms and physical signs which is pathognomonic of tuberculosis and which cannot be simulated by other diseases.

4. Finally, there is one other point in connexion with the method of performing the test we have adopted which is of importance in explaining the high degree of accuracy attained by this method. This relates to the amount of fixation of complement necessary for the reaction to be regarded as positive. Having, as we believe we have, in a dilute emulsion of tubercle bacilli an antigen possessing no non-specific complement fixing properties, we might reasonably expect to be able to detect relatively small amounts of specific antibodies. There can be no doubt that in some cases of active pulmonary tuberculosis the antibodies are present in the serum in small amounts only. We have found that any appreciable inhibition of haemolysis in the presence of one and a half H.D. of complement as estimated by titration in the presence of antigen should be regarded as a positive reaction.

There is one point upon which nearly all workers appear to agree. No test is likely to give 100 per cent. degree of accuracy in all cases. In our series some 2 to 3 per cent. of definite cases of pulmonary tuberculosis have given a negative result. It is the very acute and advanced case which may give a negative result. Many other workers have found also that moribund cases may react negatively.

Conclusion.

We have tried to suggest some of the possible causes of the uncertainty which up to the present time has existed as to the value of the complement fixation test in tuberculosis. In spite of much contradictory evidence we think there has been a steady improvement in the method employed and the results obtained. The work that we have done appears to be in line with the work that has gone before, to which it gives merely the finishing touch.

It would appear to us that the work above described gives clear proof of the great value of the complement fixation test in the diagnosis and exclusion of active or recently active pulmonary tuberculosis.

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COMPLEMENT FIXATION TESTS AND TUBERCULOSIS.

BY

ARTHUR SELLERS, M.D.,

LECTURER IN COMPARATIVE PATHOLOGY, UNIVERSITY OF MANCHESTER; PATHOLOGIST, MANCHESTER CHILDREN'S HOSPITAL AND NORTHERN HOSPITAL.

THE present contribution continues some work published previously,[1] but some modifications of the technique originally used have been made.

For the present purpose two antigens were used.

Antigen Wang was an extract prepared after the method of Wang and Crocket,[2] and was practically the same as the one used for the former work. It was made from seven strains of tubercle bacilli grown on glycerine veal broth—three human (sputum, adults), three human (bone), one bovine (milk). It is essentially the residue of a mass of bacilli left after repeated alternate extraction with alcohol, ether, and chloroform.

Antigen Besredka was prepared from a culture of one human strain grown on Besredka's medium[3] consisting of egg yolk and water for three weeks. The contents of the flask were sterilized in the autoclave and shaken as recommended by Besredka and a little phenol added.

The dilution in which each antigen could be used was found by a technique similar to that used in testing extracts for Wassermann tests. The dosage for routine work was determined by finding the lowest dilution which was devoid of anticomplementary action. Thus Wang could be used 1 in 40; Besredka, 1 in 20.

In the previous work most of the tests were made with a dose of complement determined for each set by a preliminary titration of the guinea-pig serum used, in the presence of antigen. In the present series this preliminary titration was omitted and the tests were made with a constant dose of 0.5 of 1 in 10 serum. This plan incurs the risk of missing some cases not capable of giving a strong reaction, but probably eliminates some fallacious reactions. The complement was obtained from the pooled serums in three or more healthy male guinea-pigs. Its minimum haemolytic dose was always at least 1 in 40 (0.5 of 1 in 40 in 2.5 fluid) and frequently higher. None of the antigens were used in such concentration as would fix 1 minimum haemolytic dose of whatever complement was in use for the day's work, in the absence of patients' serum. The patients' serums were inactivated by heating for thirty minutes at 56° C. Whenever possible they were examined soon after collection or were kept in a refrigerator and heated a second time for ten minutes on the day of examination. The serum dosage was 0.5 of 1 in 5. Most of the specimens of blood were taken from either the finger or the ear of the patient.

Cerebro-spinal Fluid.—These specimens were not heated but were kept in a refrigerator if they could not be tested when quite fresh. Some specimens had to be rejected because they were found to be anticomplementary. There is no reason why cerebro-spinal fluid should not be heated, and probably heating would have saved some specimens which were found unsatisfactory.

The following scheme shows the routine method of performing the tests:

	Tube 1.	Tube 2.	Tube 3.
Serum dilution 1 in 5 or cerebro-spinal fluid undiluted	0.5	0.5	0
Complement 1 in 10...	0.5	0.5	0.5
Antigen dilution	0	0.5	0.5
Saline	0.5	0	0.5

Incubation one hour at 37° C. Sensitized corpuscles, 1 c.cm. added. Reincubation thirty minutes. The sensitized corpuscles were prepared by mixing a 5 per cent. suspension of washed sheep's corpuscles with an equal volume of diluted haemolytic rabbit-sheep serum of such concentration that at least 10 minimum haemolytic doses were present in each cubic centimetre of the mixture.

The results were recorded as positive, negative, or doubtful. A positive result was recorded when there was either no haemolysis in Tube 2 or only a trace, a negative when haemolysis was complete, and a doubtful when haemolysis was incomplete. In the various tables some of the doubtful reactions are included as positive, but none were regarded as positive in which there was not clear evidence that some fixation of complement had occurred. The method of reading tends towards the inclusion of some negative results as positive, but as the amount of complement used was large it appeared better to adopt this interpretation of the results.

Table I shows the results obtained with specimens of blood. The patients were under treatment in hospital and most of them were under observation for many months. They were all children aged 15¾ to 6 years—twenty-six boys and thirty-one girls, suffering from some form of chronic tuberculosis of bones or joints or lymphatic glands (one case only of cervical adenitis) including spine, hip, ankle, knee, finger (one case only), tuberculous pyelitis (one case), without evidence of visceral lesions and none of them having tuberculin treatment. Each specimen was tested with two antigens.

TABLE I.—*Blood; Tuberculosis of Bones and Joints: Children.*

	Positive.	Negative.	Percentage of Positives.
Wang	27	39	40.7
Besredka	37	20	64.9

Some disagreements were noted on comparing the results given by the two antigens, but in every instance where Wang gave a positive Besredka was also positive. No Wassermann tests were made with these specimens.

Control Specimens.—Eight serums from cases of various conditions, including hydrocephalus, anaemia, rheumatic fever, synovitis, cerebral tumour, mastoid disease, and malnutrition, gave negative results with both antigens. Two serums with a strongly positive Wassermann also gave negative results. In four instances, all giving a negative reaction, the clinical diagnosis of tuberculosis was open to some doubt. One patient, F., aged 8 years, had pyelitis, but no tubercle bacilli were found in the urine; when 6 years old she had an abdominal operation and a tuberculous lymphatic gland was removed; there was no other evidence of tuberculosis. One patient (aged 1 year and 4 months) had a tuberculous dactylitis (M., aged 1 year and 4 months); tubercle bacilli were not found in scrapings. Another case (aged 7 years) was diagnosed clinically as abdominal tuberculosis, but not confirmed. The fourth case was diagnosed as tuberculous meningitis, but a definite tuberculous infection could not be established; the cerebro-spinal fluid gave a positive result. In all the other cases the diagnosis of tuberculosis of some form was not open to doubt.

Cerebro-spinal Fluid.—These specimens were from cases of meningitis or suspected meningitis, and in ten instances

the clinical diagnosis was confirmed either by *post-mortem* examination or by finding tubercle bacilli by microscopic examination. All of them were more or less pathological fluids, but none showed more than a trace of turbidity. With two exceptions the patients were all children.

TABLE II.—*Cerebro-spinal Fluid: Tuberculous Meningitis.*

	Positive.	Negative.	No. of Specimens.	Percentage of Positives.
Wang	13	5	18	72.2
Besredka	5	12	17	29.4

This table does not enable a comparison to be made between the properties of the two antigens, as the specimens were not all tested with both. The results given with seventeen specimens tested with both are shown in Table III.

TABLE III.—*Cerebro-spinal Fluid: Two Antigens.*

	Positive.	Negative.	Percentage of Positives.
Wang	12	5	70
Besredka	6	11	35

In six instances Besredka gave negative and Wang positive results. In all cases where Besredka gave a positive Wang was also positive. Thus it appears as if Wang were the better of the two for testing cerebro-spinal fluid.

Cerebro-spinal Fluid Controls.—The cases for which these specimens were obtained included acute and chronic conditions with no evidence of tuberculosis, cerebro-spinal fever (1), meningo-encephalitis of doubtful nature (1), encephalitis lethargica (1), septic throat with meningeal symptoms (1), cerebral tumour (1), uraemia (1), meningocele (1), hydrocephalus (3), and some other conditions of doubtful nature.

TABLE IV.—*Cerebro-spinal Fluid: Controls.*

	Positive.	Negative.	Total.
Wang	7	13	20
Besredka	2	14	16

Sixteen specimens were tested with both antigens, and of these there were three in which Wang was positive and Besredka negative. In every instance where Besredka was positive, Wang was also positive. Apparently Wang is liable to give more fallacious reactions than Besredka.

REMARKS.

Complement fixation tests in tuberculous constitutions have been the subject of much study and many workers have found the test to be of high diagnostic value. In concluding my previous communication I said I was not satisfied that complement fixation tests afford a reliable means of clinical diagnosis in tuberculous cases, and I remain of the same opinion. The reaction is a specific one in the sense that under certain conditions the mixture serum *plus* extract will fix more complement than either of two alone, but it seems clear that the property of fixing complement in the presence of an antigen derived from tubercle bacilli is shared by serums from cases other than cases of tuberculosis. A positive result does not necessarily mean a definite tuberculous infection. Probably the number of such false diagnostic reactions is not large, but the fact that they occur must not be ignored. One of the chief aims of the present work was to see whether Besredka was better than Wang, and the results are encouraging. The results with control specimens of cerebro-spinal fluid were disappointing.

Prognostic Value of the Test.

Through the kindness of Mr. Telford, some observations were made on the prognostic value of the test. The patients were children aged 6 to 15 years, inmates of the Swinton School for Crippled Children under treatment for various forms of chronic tuberculosis of spine, hip, and knee. They were under close observation for long periods, and it was possible in twenty-nine instances to make two tests with two antigens on each occasion. The specimens of blood were collected by the matron of the hospital, Miss M. Draper. The first series of tests were made between November, 1921, and February, 1922, and the second during the latter part of 1922. In July, 1922, and March, 1923, Mr. Telford made a special clinical examination of the children and stated in each instance whether the progress of the case had been good or bad. In giving his opinion he was guided by such clinical evidence as seemed of importance in the light of his long experience of such cases. There was usually something definite, such as abscess formation or loss of weight, to help him, but in some instances it was difficult for him to make a decision. The terms "good" and "bad," therefore, must be interpreted liberally—that in his opinion as surgeon the progress had been more or less satisfactory. The results given by the two antigens were not always in agreement. Every patient gave at least one positive reaction with one or other of the antigens on either the first or second examination. The following table shows the results obtained with each antigen, the number of positive and negative reactions, and the number of cases in which the progress in the period intervening between the collection of the sample of blood and the time of clinical review had been good or bad.

	First Series.				Second Series.			
	Positive Reaction.		Negative Reaction.		Positive Reaction.		Negative Reaction.	
	No.	Progress.	No.	Progress.	No.	Progress.	No.	Progress.
Wang ...	9	Bad 1 Good 8 (88%)	20	Bad 6 Good 14 (70%)	24	Bad 5 Good 19 (20%)	5	Bad 0 Good 5
Besredka	18	Bad 2 Good 16 (88%)	11	Bad 5 Good 6 (54%)	19	Bad 5 Good 14 (26%)	10	Bad 0 Good 10

Apparently a positive reaction in a case of active tuberculosis is more favourable as regards prognosis than a negative, but where there are no signs of active tuberculosis a negative result points to a healed tuberculosis. A negative reaction followed by a positive indicates that improvement is setting in. These points are shown in the following diagram, which shows the number of instances where the reaction was unchanged or changed. The figures above the short horizontal line are "progress good" and below it "progress bad." The figures to the left relate to antigen Wang and to the right to antigen Besredka.

Positive Unchanged.		Positive to Negative.		Negative Unchanged.		Negative to Positive.	
6	9	3	9	2	1	13	6
0	0	0	0	0	0	4	4

The number in the various categories are small and it is unsafe to draw conclusions from them. The three cases included in "negative unchanged" were very slow chronic cases, and on first clinical examination in July, 1922, were progressing badly. They subsequently did better and were probably healed at the time of the second test.

On the whole it cannot be maintained that the indications furnished in this work as regards prognosis could have been of any great assistance to the clinician.

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British Medical Association.

PROCEEDINGS OF SECTIONS AT THE ANNUAL MEETING, 1923.

SECTION OF TUBERCULOSIS.

Sir HENRY J. GAUVAIN, M.D., M.Ch., President.

DISCUSSION ON THE ARTIFICIAL LIGHT TREATMENT OF LUPUS AND OTHER FORMS OF TUBERCULOSIS.

OPENING PAPER

BY

DR. AXEL REYN,

Medical Superintendent, Finsen's Medicinske Lysinstitut, Copenhagen.

(*With Special Plate.*)

I SHOULD like first to tender my thanks to you for having invited me to speak on the treatment of tuberculous disease with artificial light. I deeply appreciate the honour, and I shall, in the time allotted me, try to sketch the more important principles of this treatment and show its great value.

You know, as well as I do, that the creator of the light treatment was the late Professor Finsen. Time does not allow me to mention all Finsen's different investigations on which he based the light treatment, and, indeed, greatly helped the rapid development of all radiotherapy. I must restrict myself to mentioning only the light treatment and its results in different forms of surgical tuberculosis and tuberculosis of the skin.

After a lengthy series of investigations Finsen proposed to utilize light concentrated through lenses for local treatment, and non-concentrated for exposing the whole body to light baths. These two forms of treatment are entirely different, not merely in their principles but also in their mode of action. In the local treatment with concentrated chemical light one is treating a very small portion of the part that is affected, with an extremely powerful chemical light. The treatment is based on the light's qualities of being able to destroy the bacteria and of producing inflammation in the skin, which qualities we utilize to bring about the direct destruction of all affected parts of the tissue. The light bath, on the contrary, is a universal irradiance; thus, in irradiating the whole body by chemical rays we endeavour to play upon the whole organism and to cure different diseases. No stress is laid on irradiating the affected parts, but great weight is laid on giving the surface of the human body as much light as possible.

LOCAL TREATMENT.

At the beginning of his experiments Finsen used the sun as a source of light; but it was clear to him that if light treatment was to be of any great value at all in northern countries, where there is a lack of sunshine, it would be necessary to make use of artificial light. Finsen chose as an artificial light source the carbon arc light, as being, among the whole class of artificial light, that which in its properties and composition comes nearest to the light of the sun, having almost a continuous spectrum.

In further experiments Finsen showed that the ultra-violet rays have the strongest effect, and consequently he gradually employed only artificial light, for the carbon arc light contains far more ultra-violet rays than the sun, the ultra-violet rays of which are absorbed by the atmosphere. The installation used for local treatment with concentrated chemical light is composed of a 50-ampère carbon arc light lamp; hanging around the lamp there are four apparatus with four convergent lenses for concentrating the light; these lenses are made of rock-crystal, which, unlike ordinary glass, does not absorb the ultra-violet rays. Along with the chemical rays the heating rays also are, of course, concentrated. For absorption of these a layer of distilled water is placed between some of the lenses.

Chemical rays have the power of penetrating the body, but as soon as the rays get at the tissues filled with blood, all chemical light will be absorbed by the blood; consequently if you want the light to have any effect in the deeper parts of the body the skin must be made bloodless. Finsen therefore constructed a compressing apparatus, by means of which he pressed away the blood from the spot to be irradiated. The lenses in the compressor are made of rock-crystal.

By this installation four patients can undergo treatment at one and the same time; furthermore, we have constructed an apparatus for treating a single patient (the Finsen-Reyn apparatus). The principles are quite the same as by the larger installation.

LIGHT BATHS.

I have already told you that Finsen proposed utilizing the sun or artificial light to irradiate the whole body. He was of opinion that the general effect of light on the organism could be utilized in curing a series of diseases, amongst others tuberculosis. He died, unfortunately, before he could finish his work on light-bath treatment, and it was left to others to carry out the experiments first laid down by him. In Switzerland, Bernhard, and, somewhat later, Rollier, and in England Sir Henry Gauvain, were the first to use the sun bath for surgical tuberculosis.

Having seen the excellent results that Rollier obtained, I decided to try light baths in treating lupus vulgaris and various forms of surgical tuberculosis. But we are at a natural disadvantage in regard to sun baths in the northern lowlands, because the chemical power of the sunlight is only very small, owing to atmospheric absorption; furthermore, bright sunny days are very few and far between. Heliotherapy, therefore, can only be used in the summer months and at the seaside, where the value of the sun is enhanced by the reflection of light from the mirror surface of the sea. In winter there is next to no chemical power in the sunlight and the weather is too bleak to allow patients to be out of doors in a naked state, and to use sun baths in closed rooms behind window panes is of no value, on account of the glass absorbing the chemical rays which escape atmospheric absorption. If the light bath treatment is to be of any benefit at all in northern countries artificial light must take the place of sunlight.

The results we have obtained at the Finsen Institute in Copenhagen have shown that this is feasible. In the beginning we only used carbon arc light simply because this light has a spectrum almost like the spectrum of sunlight. The carbon arc-light lamps that we are using, both in local light treatment and in light baths, are burning with direct current, for the light we utilize is coming from the crater on the positive carbon, and if one would use alternating current no crater would be formed.

The most favourable voltage is 50 to 52 volts in the lamp; by this voltage most chemical light is obtained, as was proved by Finsen. The voltage necessary in the conducted current has to be 70 volts, for the lamp will only burn quietly and steadily if there is a small surplus in the current; this surplus has to be absorbed by a resistance. The carbons are perpendicular and the focus has to be fixed; the dimensions of the carbons are also of greatest importance and a point not to be overlooked.

For a 75-ampère lamp the upper carbon must be 31 mm. and the lower 22 mm. in diameter; for a 50-ampère lamp 24 mm. and 17 mm.; and for a 20-ampère lamp 12 mm. and 8 mm. in diameter. Special lamps should therefore be constructed for both local treatment with concentrated light and for the light baths, and ordinary kinds of carbon arc-light lamps should not be used, for good results will not then be obtained. In the Finsen Institute we have constructed such lamps. The lamp must never, as I have seen in some places, be enclosed in an envelope of any kind of glass, for this will simply absorb chemical light.

If we want to treat more patients at one time we use two 75-ampère lamps hanging side by side; the space

between the lamps is 0.6 metre, measured between the carbons, and the crater on the positive carbon is 1 metre from the ground. The patients are sitting round the lamps. Should we have to treat patients who cannot support a sitting posture, we make use of three 20-ampère lamps hanging side by side; the space between the lamps is 0.55 metre, measured between the carbons; the crater on the positive carbon is 30 to 35 cm. over the couch of the patient.

The 75-ampère lamps, of course, are radiating much more chemical light than the 20-ampère lamps; but at the same time the heat rays are increased considerably and consequently one can get much nearer the 20-ampère lamps than the 75-ampère ones.

The intensity of light decreases with the square of the distance; if the patient, therefore, is 1 metre from the light crater, he gets only a quarter of the light that he gets if the distance is 0.5 metre. You will understand, after my remarks about the heat rays, that we can assess the difference in the light intensity between the two installations by placing the patient nearer the light itself.

Around the 75-ampère lamps from six to eight patients can sit at one time, and by employing the 20-ampère lamps we can treat two patients in a reclining position at the same time.

If one wished to have patients in a reclining posture treated by the big lamps, one could have only two patients, for if a greater number were to be treated at the same time one patient would merely shade the other. Thus it is more economical to apply the 75-ampère lamps, if one has many patients who are able to assume a sitting posture, and the 20-ampère lamps if one is treating patients who have to be in a reclining position.

I shall now review the diseases we treat.

I. Lupus Vulgaris and Other Forms of Skin Tuberculosis.

The local application of concentrated light in the treatment of lupus vulgaris, introduced by Finsen, was an entirely new therapeutic principle. The aim was to attack from outside the diseased tissue without injuring at all the healthy tissue, and experiments showed that the concentrated light produced a proliferation of the healthy tissue, bringing about a new formation of vessels, and at the same time destroying the diseased cells. It was shown to be a considerable advance in the treatment of lupus vulgaris. This disease was really, in a large number of cases, incurable, and those of the patients who were cured remained disfigured with ugly scars. The majority of these patients are now cured by Finsen's local light treatment, leaving only smooth and almost imperceptible scars.

A vast collection of material shows, in our experience, that over 60 per cent. of cases were cured. Dr. Sequeira, of the London Hospital,* one of the first to make use of the treatment, has had 70 per cent. of permanent cures; he is of opinion that we have had under treatment a graver type of lupus than he has had in the London Hospital. The results of the treatment of tuberculosis verrucosa and tuberculosis colliquativa have been even more excellent (90 to 100 per cent. cured).

The value of the local application of concentrated light is, of course, incontestable, but we have long recognized that a certain number of cases are refractory to the treatment, and in other cases the disease has a tendency to increase too rapidly to be dealt with adequately by this local treatment, or, if apparently cured, is likely to relapse. Finally, some cases are so advanced before treatment that they already have a bad prognosis.

In these cases I decided first to try the carbon arc-light baths, and the results were better than I expected. I succeeded in curing 96 patients out of 114 by the combination of local light treatment and light baths—cases which had failed to be cured by the local application of concentrated light, notwithstanding that they had been treated very energetically. On examining the figures now, where patients under treatment for lupus vulgaris are getting local light treatment and light baths simultaneously, I find that the proportion of permanent cures is about 90 per cent. The enormous value of light baths in the treatment of lupus vulgaris is evident from the fact that not only are the results getting much better but also the time devoted to curing patients is getting much less.

One might ask whether light baths alone are not able to cure the patients; but I can assure you that however invaluable the light baths are in the treatment of lupus vulgaris, so indispensable also is the local Finsen treatment. No doubt a single little spot can disappear by the light bath, but it is very rare. The disease can be improved by light baths alone, but a real cure will not occur without local application of concentrated light.

I would now like to show you some illustrations of patients before and after treatment. (See special plate.)

II. Surgical Tuberculosis.

Simultaneously with the light bath treatment of lupus vulgaris, I have also tried the effect of carbon arc light on different kinds of surgical tuberculosis, and I have asked the consulting surgeon in our institute, Dr. N. P. Ernst, to examine and to control these patients.

During a period of eight years (1913-1921) we have treated no fewer than 439 patients by carbon arc-light baths—145 with uncomplicated closed cases of surgical tuberculosis and 294 complicated with sinuses or abscesses. The results have been most excellent, according to the accompanying table taken from the late Dr. N. P. Ernst's latest report (*Acta Radiologica*, vol. i, 422).

In the table you will find the cases more numerous than the number of patients, for many of the patients were suffering from two or more diseases at the same time. The value of percentage of cures is increased owing to the fact that almost all cured patients are observed for several years after their cure. I would also draw your attention to the fact that a great number of the cured patients have regained free mobility of their joints.

If you would judge the results obtained by the application of carbon arc-light baths in the treatment of all these patients, it is necessary to remember that our patients are mainly adults (70 per cent. were more than 15 years of age), and you know that tuberculosis in adults is more difficult to cure than in the case of children. It should be remembered also that many of our patients, owing to lack of space in the institute, have had to be treated as out-patients, and during the light treatment they have lived in their own homes, which are often very poor and unhealthy. Daily, or every other day, they have had to be transported to the institute, and you will very well understand that this moving about has not benefited them. Finally, it must be emphasized that many of our patients, especially those with pelvic osteitis, hip disease, and spinal caries, have been suffering for so many years that one could not hope for recovery, but we considered it our duty to make an attempt.

The results obtained by application of carbon arc-light baths in the treatment of surgical tuberculosis are brilliant. To give an idea of the value of the results obtained by us I should like to make a comparison with the results obtained by Rollier, calling to mind, however, that he is working under much more favourable conditions with his patients inside his hospital. I take the figures from Rollier's *Le cure de soleil*, 1915.

Ankle-joint.—Of 94 cases, complicated and non-complicated, Rollier registered 87 (92 per cent.) as cured, but under tuberculosis of the ankle-joint he includes cases of osteitis in the calcaneus, tarsus, and metatarsus, which have a far more favourable prognosis than those which Dr. Ernst includes—namely, tuberculosis round the astragalus. Of the 47 cases which Ernst includes among ankle-joint tuberculosis, we have cured 42 (89 per cent.), and 36 of these cured patients have regained complete mobility of their limbs.

Tuberculosis of the Elbow.—The proportion of cures by Rollier is 66 per cent.; we have to record 83 per cent.

The results we have had in treating different forms of surgical tuberculosis are at least as good as those obtained by heliotherapy in mountain heights.

* After this paper was written I read Dr. Sequeira's paper, "Carbon arc-light baths in the treatment of lupus vulgaris" (*Brit. Journ. of Dermatology*, March, 1923). I am quite in agreement with Dr. Sequeira in the views therein stated.

Table showing Results in Closed Uncomplicated Cases, and Cases Complicated with Sinuses or Abscesses.

	Number.	Over 15 Years.	Duration beyond Six Months Before Light Baths.	Changes in Skiagram.	Recovered.			Improved.	Unchanged.	Died under Treatment.	Treatment Abandoned by Patient.	Controlled.			Relapses.	Cured later.
					Free Mobility.	Partial Mobility.	Without Mobility					Total.	Over 1 year.	Over 3 Years.		
Closed uncomplicated cases.																
Dactylitis	22	5	1	20	22	—	—	—	—	—	—	21	8	8	—	—
Tuberculosis of wrist	23	19	19	21	16	3	—	2	1	—	1	21	8	13	1	1
„ of elbow	17	12	9	16	9	4	2	—	2	—	—	14	7	5	—	—
„ of shoulder	7	7	5	6	3	2	2	—	—	—	—	7	5	2	—	—
„ of ankle	14	8	10	9	9	1	4	—	—	—	—	13	7	3	—	—
„ of knee	42	28	34	24	15	7	5	2	8	1	4	29	10	11	5	1
„ of hip	7	2	3	5	1	1	3	—	—	—	2	5	1	3	1	—
„ of spine	7	5	4	4	4	—	—	1	—	—	2	4	4	—	—	—
Tenosynovitis	8	7	6	—	1	—	—	—	7	—	—	—	—	—	—	—
Peritonitis	8	4	5	—	6	—	—	—	—	—	—	6	1	3	1	—
Genito-urinary tuberculosis	3	3	—	—	2	—	—	—	1	—	—	2	1	1	—	—
Cases complicated with fistula or abscess.																
Dactylitis	56	21	29	47	41	5	3	—	—	1	6	9	26	14	4	2
Tuberculosis of wrist	24	22	21	21	6	12	1	1	1	—	3	18	9	2	1	1
„ of elbow	31	23	23	24	10	17	3	—	1	—	—	22	13	6	5	4
„ of shoulder	8	6	8	8	1	4	2	—	1	—	—	6	2	1	2	2
„ of ankle	33	26	30	29	14	12	2	2	—	2	1	30	14	11	1	—
„ of knee	14	11	14	12	1	1	7	2	2	—	1	9	3	6	2	—
„ of hip	15	12	15	10	—	4	4	—	5	1	1	8	2	4	2	—
Tuberculous disease of ribs and sternum	32	29	24	4	23	—	—	—	5	—	4	23	11	6	4	—
Osteitis (60 patients)	73	47	62	38	68	—	—	2	1	1	1	68	41	13	2	2
Pelvic osteitis	11	8	10	5	6	—	—	—	3	2	—	6	1	2	—	—
Tuberculosis of spine	20	16	16	5	11	—	—	1	3	3	2	11	7	2	1	—
Subcutaneous tuberculosis	42	30	23	—	37	—	—	2	1	—	2	36	25	7	—	—
Tenosynovitis	8	7	8	—	7	—	—	—	—	—	1	5	3	—	—	—
Peritonitis	7	2	7	—	4	—	—	1	2	—	—	4	3	1	—	—
Genito-urinary tuberculosis (female)	6	6	6	—	4	—	—	2	—	—	—	6	2	3	2	1
„ „ „ (male)	16	16	11	—	12	—	—	2	—	—	2	12	6	4	—	—

I shall refer later on to the conclusions to be derived from this fact, but here I would like to request your attention to the conclusions that Dr. Ernst comes to in his last report:

"If, in conclusion, I attempt to state which cases of surgical tuberculosis adapt themselves best to light-bath treatment, this will be most easily done by recapitulating the cases which have proved refractory. These are the uncomplicated tenosynovitis cases, and the very old fistulous bone affections in the spinal column, pelvis, and hip, while the later cases (of about twelve months' standing) are not particularly unfavourable to treatment.

"As regards the knee, I have become more conservative in my treatment of adults with whom a fixed condition of flexion has already set in or where there are very severe capsular changes. In many of these cases it will end in resection.

"Slight tuberculosis of the lungs is no contraindication for light-bath treatment, but one must, of course, consider the general state of health, especially the condition of the lungs, heart, and kidneys."

The time spent in curing a patient naturally differs according to the nature and locality of the affection. Broadly speaking, one can say that children get cured more rapidly than adults, and affections of the small joints are more quickly and easily healed than those in the large joints. Very excellent results and quick recovery is obtained in tuberculosis of the soft tissues and bones.

The shortest time we have needed for a cure was one month, but often the cure has taken six months, and in some cases even two years and more; but to a doctor accustomed to treating tuberculosis this is quite natural.

As a separate group I wish to mention tuberculous glands. In the first years, owing to lack of space, I treated only a very few cases, but later on the number of patients treated by radiotherapy increased more and more. You are well aware that *x* rays are applied to a considerable extent in the treatment of tuberculous glands; medical authorities find that hyperplastic forms give the best results, while the glands with sinuses give less favourable results.

For some time I had treated the glands entirely with *x* rays, and only in very serious cases, with formation of sinuses, have I employed light baths; however, as soon as the accommodation permitted it, I utilized light in addition to *x* rays, for I found out that the results obtained by *x* rays alone were less satisfactory.

The results I have obtained by the combination of carbon arc light baths and *x* rays and by light baths alone have been excellent, not only in cases of hyperplastic glands, but also in sinus cases; about 95 per cent. of 500 cases have been cured, among which were many severe cases of several years' duration.

The results illustrate to an eminent degree the great value of carbon arc light baths in the fight against tuberculosis.

What Conclusion can now be Drawn from the Results Obtained by Treatment with Artificial Chemical Light Baths at the Finsen Institute?

First, we learn from the results by Rollier and in the Finsen Institute that non-operative treatment ought to be used in cases of surgical tuberculosis, not only in children, but also in adults, as Sir Henry Gauvain put forward in the *Lancet* in 1921 (i, 1065), when he published the brilliant results obtained by him at the Treloar Cripples' Hospital and College at Alton and Hayling Island. Secondly, we learn that the most important factor in the conservative treatment of surgical tuberculosis in the mountains is the powerful light to be had there; many of the patients treated at the Finsen Institute, however, have been living under very poor hygienic conditions, and despite this fact they have recovered.

What I have said on this point is not to be understood in the sense that we should not obtain better results if we made use of all factors which we have in the mountains or at the seaside—namely, the crisp air devoid of mist, the benefit of sea baths, etc. Particular stress must, however, be laid on the light, and in the sanatorium at the seaside and in the mountains there should be artificial sources of light for light baths for the times when the sun cannot be utilized, for then the results would be much better and the time spent on the treatment of less duration.

Conservative treatment of surgical tuberculosis is not to be understood in the meaning that operative treatment must never be employed—that is not the correct definition, for it happens very often that abscesses have to be aspirated and sequestra have to be removed. The correction of ankylosis or other deformities is indispensable, and if a case does not improve it may be necessary perhaps to extirpate the tuberculous lesion.

All these facts have been so well described by Sir Henry Gauvain, that it is superfluous to go further into the matter here. Furthermore, I would like to emphasize that in addition to the light it is of utmost importance to make use of all the adjuvant and auxiliary methods known to us in treating surgical tuberculosis. I shall only emphasize the enormous importance of orthopaedics, and concerning the rest I would refer you to Sir Henry Gauvain's papers to be found in the *Lancet* and the *British Medical Journal* (November 26th, 1921, p. 876).

How are we to Explain the Effect of Light on Tuberculosis?

I regret to say we have not advanced any further in our knowledge of this question than did Finsen in his day. Light gives an erythema of the skin, followed and accompanied by pigmentation, and light has a stimulating effect on the organism in general. The results are obtained only clinically, and conclusions must be drawn by clinical results alone. Not that explanations and experiments are wanting, but these are merely hypotheses. I shall therefore not touch on this point, but try to find out what is to be learnt by clinical experiences.

In the treatment by heliotherapy of cases of surgical tuberculosis we obtain by far the best results in the mountains or at the seaside, while the results in low-lying inland regions are less favourable. From this fact we must conclude that the chemical power in the sunlight is of great importance to the treatment, for the atmosphere absorbs the chemical rays, and the more compact the atmosphere is, the greater is the absorption. The chemical power of the sun is therefore much less in lowland districts than in mountain heights; at the seaside the lesser intensity is compensated by reflection of light from the mirror surface of the sea, by which the intensity of light is increased enormously. This shows us that for good effects the chemical power of light is decisive.

What Kind of Chemical Rays are in Question?

On this point we know but very little. We are aware, however, that the atmosphere especially absorbs the ultra-violet rays; these therefore must be the most important, and especially the ultra-violet rays with long waves, for the thinnest layer of the atmosphere absorbs all rays with short waves. A series of investigations (Jansen, Maar, Hasselbalck) shows us that the greatest importance must be placed on the ultra-violet long wave rays; these alone have the power of penetrating the epidermis. The violet, blue, and green rays are also of a certain value, as Finsen's experiments have shown; and recently Sonne claims that not only these rays, but also the green, yellow, and luminous red rays are of importance, according to experiments made by him in the Finsen Institute.

What Kind of Illumination is to be Preferred?

Naturally the sun is the best and the most economical source of light, when it can be used. As mentioned already, the atmosphere absorbs a great deal of the chemical light of the sun; the absorption increases in proportion to the thickness of the atmosphere—in other words, it is greatest in lowland countries. Furthermore, the less perpendicular the rays are, the greater is the absorption from the atmosphere, because the length of the rays, passing through the lower and more concentrated regions of the atmosphere, increase as the rays fall less and less perpendicularly. The chemical force of the sun is, therefore, considerably greater in the mountains than in the lowlands, though I must emphasize once again that at the seaside the light intensity is increased very considerably by the reflection of the mirror surface of the sea.

In the mountains the sun can be used during the greater part of the year, but in the lowlands only when the light is falling rather perpendicularly—in Northern Europe, for example, only in summer, and, of course, in bright and clear weather. In the mountains as well as in the lowlands artificial illumination should be employed during the absence of sunlight.

What Kind of Artificial Light Sources are to be Used?

Practically we have only two sources that contain a quantity of chemical light, worth mentioning—namely, the carbon arc light and the mercury-vapour arc light. The difference between these two kinds of lights is in reality very considerable. The carbon arc light contains all the rays of the spectrum, while the mercury light mainly contains the ultra-violet and particularly the short-waved ultra-violet rays, with but slight power of penetrating. Referring to my previous remarks on this subject it is evident that the carbon arc light is without doubt more suitable for light baths than the mercury light.

In a series of experiments undertaken at the Institute I have proved that far better results are obtained with the carbon arc light baths than with mercury light baths. In Germany the mercury light has been used most, and lamps have been constructed called *Künstliche Höhensonne*—a name that is, in reality, quite misleading, as the "high sun" contains all kinds of rays, while the spectrum of the mercury light is strongly limited, and has the maximum in the ultra-violet rays, especially those with short waves. Naturally the mercury light has some effect, and if the carbon arc light, on account of deficiency of current, cannot be employed, the mercury lamps, especially the new Jesionek lamps, are of some value; but we must not expect to obtain approximately such favourable results as with the carbon arc light.

Because of the one-sidedness of the mercury light, an attempt has been made to supply the qualities of the missing rays by using strong incandescent lamps constructed with metal wire for irradiating simultaneously with the mercury light; but it has not been possible to create a source of light proportionately equal in value to the carbon arc lamps such as I have described.

How Long and How Often are we to Irradiate the Patients?

As has been mentioned, chemical light produces an erythema of the skin, stronger or slighter according to the time irradiated. Rollier is of opinion that strong erythemas are to be avoided, but I do not agree with this view, for I hold that the best results are obtainable with the carbon arc light if a pronounced erythema is produced in the earliest stages of the treatment. Consequently, the first light bath which a patient gets is of

FIG. 1.

FIG. 2.

Lupus vulgaris before and after treatment with concentrated chemical light and light baths.

FIG. 3.

FIG. 4.

Lupus vulgaris before and after treatment with concentrated chemical light and light baths.

FIG. 5.

FIG. 6.

Arthritis of wrist before and after light-baths treatment, cured with partially free mobility.

FIG. 7.

FIG. 8.

Spina ventosa treated for many years at a seaside sanatorium without any result, cured by light baths with complete free mobility.

FIG. 9.

FIG. 10.

FIG. 11.

Arthritis of knee before and after treatment with light baths, cured with complete free mobility.

FIG. 12.

FIG. 13.

Tuberculous glands of five years' standing with sinus formation before and after treatment, cured by light baths and local light treatment.

J. H. SEQUEIRA: TREATMENT OF CUTANEOUS TUBERCULOSIS.

FIG. 1.—D. K. Before Finsen treatment. October, 1901.

FIG. 2.—After Finsen treatment. January, 1903.

FIG. 3.—The patient in 1923.

FIG. 4.—S. S. Extensive lupus of ulcerative and fungating type. September 10th, 1921.

FIG. 5.—After treatment by local application of light. Parts of the diseased area have healed, but the disease has spread at the periphery. May 7th, 1922.

FIG. 6.—The patient after five months' treatment by light baths only.

FIG. 7.—K. F. Condition January, 1923, after two and a half years' local treatment.

FIG. 8.—July, 1923, after light baths with no local treatment.

FIG. 9.—K. F. Lupus of arm, January, 1923, after local treatment only for two and a half years.

FIG. 10.—July, 1923, after light baths with local light treatment.

thirty to forty minutes' duration; then we generally give the patient light baths every other day, increasing the time as we go on, so that after a fortnight's treatment fully two and a half hours are reached, but this time is seldom exceeded. This method is used only when patients are not feverish or suffering from serious complications such as tuberculosis of the lung; in such cases we begin with baths of only fifteen to twenty minutes' duration, increasing slowly. With the mercury light we begin with five to ten minutes, increasing slowly, for the erythema brought about by this light is extremely painful. During the irradiation the patients have to turn their bodies round, so that all parts of the body are irradiated.

In conclusion, I should like to say some few words about local treatment. This, as has already been stated, is used in the treatment of lupus vulgaris and other kinds of skin tuberculosis; but many sinus cases in patients suffering from surgical tuberculosis also undergo local light treatment with excellent results. Especially in cases of tuberculous glands with sinus formation is local light treatment of great importance, for it hinders the development of lupus vulgaris in the scars and brings about a more rapid and certain cure of the sinus.

The Finsen light installation for local treatment with concentrated chemical light is somewhat expensive and complicated; other apparatus have therefore been constructed to take the place of the Finsen one. In Germany, for example, Kromayer's mercury lamp has been much in general use; but in treating lupus vulgaris and other kinds of skin tuberculosis locally all these other kinds of lamps are much inferior to Finsen's.

In the investigations made by Jansen it is shown in a very exact and careful manner that the effect of Finsen's light treatment in lupus is to destroy the pathological cells. To bring about this destruction a rather penetrating light is necessary, but the concentrated carbon arc light is the only one that has the power of penetrating right into the depths of the tissue, as Finsen, Jansen, Hasselbalck and Maar, after their numerous experiments, have pointed out. If we desire to utilize this relatively deep effect, the tissue in question must be made bloodless, as Finsen has shown us by experiments on rabbits, and also in trying to irradiate lupus vulgaris without employing a pressure apparatus. In this last mentioned mode of treating lupus vulgaris Finsen obtained some improvement, but a real cure was, practically speaking, never brought about. If we follow up Jansen's histological experiments on lupus vulgaris, after repeated radiations, we can well understand that compression is absolutely imperative if a real cure is to be brought about.

At the Finsen Institute we observe every day proofs of the correctness of this opinion, for quite a number of our patients are suffering from lupus vulgaris to such an extensive degree that for a long time we have to restrict ourselves to local treatment in the face alone, the other spots on the body merely undergoing strong radiation by the carbon arc light during the process of light baths. These spots show great improvement in accordance with the general effect brought about by the light baths, but a real cure is exceptionally rare, and, later on, these spots have to undergo local treatment, while the face, which has been treated with concentrated chemical light simultaneously with light baths, is already cured.

I emphasize this because in France Dr. Benoit has recently stated in print that he treats lupus vulgaris with local irradiation of ultra-red rays together with ultra-violet rays, without making the tissue bloodless by pressure. Dr. Benoit takes it for granted that in this manner he influences the blood, which should again influence the local disease. Benoit, in my opinion, is quite wrong in his views, and confounds the effect of local light treatment with the effect of general treatment. With this method of irradiation he will obtain improvement, but never—or at any rate very seldom—bring about a complete cure of lupus vulgaris, because he only gets quite a superficial effect of the local process, as we have seen in treating lupus vulgaris with light baths without any local light treatment. By this treatment we irradiate the spots with a powerful carbon arc light, and this, as you are aware, gives a great mass of both red and ultra-violet rays simultaneously; but a cure, as I have already told you, can hardly ever be obtained in this way.

Summary.

1. The non-operative treatment is the principal one in cases of surgical tuberculosis, not only in children but also in adults.
2. Light baths (sun or artificial) are indispensable in the non-operative treatment of surgical tuberculosis.
3. The carbon arc light can fully replace sunlight, and is much superior to the mercury arc light.
4. Sanatoriums in mountain heights, as well as at the seaside, should have artificial light baths at their disposal.
5. In the treatment of lupus vulgaris concentrated chemical light is absolutely indispensable, and it is of the greatest value to combine local treatment with light baths.

TREATMENT OF CUTANEOUS TUBERCULOSIS.

BY

J. H. SEQUEIRA, M.D., F.R.C.P., F.R.C.S.,

Physician to the Skin and Phototherapy Departments, and Lecturer on Dermatology, London Hospital.

(*With Special Plate.*)

I ESTEEM it a great honour to follow Professor Reyn in this discussion. Nearly twenty-four years ago I had the privilege of attending the practice of the Light Institute at Copenhagen, under Professor Finsen, and Dr. Reyn was then Director of the Clinic. Since then I have followed with the greatest interest the developments of phototherapy and as opportunity offered these developments have been introduced into my own clinic at the London Hospital.

My contribution to this discussion must necessarily be brief, but I would like to direct special attention to some points which are in my experience frequently forgotten.

To get the best results in the treatment of tuberculosis of the skin, and, particularly its most common variety, lupus vulgaris, one cannot rely on local measures only. I venture to urge, and Professor Reyn's communication supports my contention, that it is necessary to make our attack on the disease a combined one. We must use local measures, and on their importance I hope to say a few words shortly, but we must also use general measures.

Local Treatment.

In lupus vulgaris we have to deal with two very distinct types of case—(1) the type which we, in practice, recognize as dry lumps, and (2) ulcerative lupus distinguished by the earlier writers as lupus exedens and lupus non-exedens. It is essentially the dry type, the type in which the lesions are characteristic, yellowish-brown, often sharply circumscribed spots or nodules imbedded in the skin, which reacts most satisfactorily to the local application of concentrated light, usually described as the Finsen treatment. I need not enter into the details of this measure, but it is established that if the lesions are comparatively limited in area and in a situation where the character of the cicatrix is of importance we can get better cosmetic results by the Finsen treatment than by any other form of therapy. Where the character of scar is of less importance we can use caustics such as strong creosote and salicylic plasters, the acid nitrate of mercury, and in some regions we can excise a patch with or without grafting.

All these measures give highly satisfactory results in a number of cases of dry lupus, provided the area is not too extensive. In extensive cases the time required is the chief drawback. With the more careful inspection of our school children and the co-operation of tuberculosis officers the disease will be recognized earlier and extensive lupus will be very rare in the future.

I should like to give one word of warning as to the treatment of dry lupus. One should never try to cure it by x rays. I agree that you can destroy a patch of dry lupus by repeated x-ray exposures, but you run a grave risk of causing cancer. We, fortunately, learnt the lesson early and for years we have endeavoured to bring to the notice of officers of hospitals and tuberculosis dispensaries

the grave risks. For a long time we have been seeing terrible cases of *x*-ray carcinoma due to excessive *x*-ray treatment administered ten, fifteen, and twenty years ago.

In ulcerative lupus and in the conditions known as scrofuloderma, we find that many local measures rapidly ameliorate the condition. Mild antiseptic treatment, cleansing with peroxide lotion, fomentations, the application of a mild mercurial lotion such as lotio hydrarg. flav., etc., and especially an occasional short exposure to *x* rays, produce a rapid movement. When the ulcers are cleaned up the local application of concentrated actinic light proves of great service. But this type, which often occurs about the muco-cutaneous junction, and is often associated with deep-seated intranasal or glandular disease, may develop with great rapidity and cause much destruction.

It is in this type that my experience shows the importance of combining general with local treatment, and the photographs which I show illustrate this point.

We have had over twenty-three years' experience of the light treatment of lupus at the London Hospital, and to test the permanence of the results following the local application of concentrated arc light by Finsen's method I have, with the aid of my staff, kept myself in touch with most of the patients who have passed through the clinic. In 1908 and again in 1913 I published analyses of these results.[1] This year, however, I made an inspection of the cases classed as cured in 1913 (Class A)—that is, after a lapse of ten years—and although we failed to get in touch with a number of the patients owing to the war, change of address, marriage, etc., we got reliable evidence either from personal examination, medical or other reports, that 132 of the patients had remained cured from ten to twenty-two years, and this in spite of the lack of nutritious food due to war conditions. I append photographs of a characteristic case remaining cured twenty-one years after treatment (Figs. 1, 2, 3).

A second group of cases (Class B) was also examined, and in this type there have been slight relapses, but the majority of the patients have been able to continue in their employment with short intervals for treatment. Some, indeed, have done so well that they would now come into Class A.

With regard to the percentage of cures effected by the local applications of light, our figures tally very closely with those of Professor Reyn, about 70 per cent. This is slightly higher than the Copenhagen figures, but my own observations showed that the type of case seen in the Danish institute was often graver than our own.

General Treatment.

We have always had a percentage of intractable cases, the intractability being shown (1) by the fact that the area of lupus increased faster than we could cope with it by the light treatment, and (2) by the extensive involvement of the nasal and sometimes the buccal cavity.

It is in this type of case that we have been looking for some measure which would help to improve the patient's resistance. At first we were very hopeful that the tuberculin treatment, especially after the developments following Sir Almroth Wright's work, would be of great service, and in this we have to record failure except in some ulcerative cases and in cases of scrofuloderma, but in many of these apparent cure has been followed by relapse. The dry type of lupus failed to be benefited at all by tuberculin treatment.

Dreyer's defatted antigen is an advance and has appeared to be of distinct value already in the ulcerative type of case. It is too early to predict what will be the result in the cases of dry lupus. In this variety the nodules are so imbedded, very often in connective tissue hypertrophy, that we cannot expect such an active reaction.

In the light bath we have, I am convinced, a most valuable adjunct to the local therapy, and I have now twelve months' experience of this measure in the treatment of the more serious and intractable cases of lupus. Strandberg, working in the Finsen Institute, has shown that intranasal lupus, always an extremely difficult affection to combat by surgical measures or other local measures, may be cured in the light bath, and I can confirm his observations.[2]

As our installation has been limited and to some extent experimental, we have only dealt with cases which have failed to be cured by the application of light locally, and I am sure Professor Reyn does not overstate the case in claiming that the percentage of cures can be increased from 60 to 90 by a combination of the local application of light with carbon arc-light baths.

At first the sittings are of half an hour's duration, and they are gradually extended until both anterior and posterior surfaces are exposed for two hours. Great care is taken to protect the eyes when the front of the body is exposed. Any open sores are covered by a simple dressing. The sittings are given daily. The group of nude figures round the lamp is surrounded by a screen, and care is taken to prevent the possibility of the blindfolded patient coming too near the arc. We are now treating eight at one arc lamp at once. The effects observed are:

1. Pigmentation of whole surface.
2. Rapid healing, especially of moist, rather fungating lesions.
3. Increase of body weight.
4. Improvement in the general condition.
5. Usually an increase of the small lymphocytes in the blood count.

The boy whose photographs are shown (Figs. 4, 5, 6) came under treatment in September, 1921. He was treated by the local application of concentrated light until May, 1922, and although parts of the affected area healed under this measure the disease spread at the periphery. He was then submitted to the light bath only, local treatment being suspended, and in the third photo the improvement is obvious. We have since combined both therapeutic measures and have cleared the few remaining nodules.

The girl whose photographs are appended (Figs. 7, 8, 9, 10) had steadily increasing lupus of the face, neck, and upper limbs, in spite of vigorous local treatment. In six months every lesion had soundly healed with the combination of light baths administered daily and local treatment. Her general physique has also improved remarkably.

The young man whose case was also illustrated had been under local treatment for a year with very poor result. He was a lazy, untidy youth from an agricultural district, and I had even advised his return home as incurable, when the light bath was introduced. He was one of the first patients and we were gratified to find that he responded at once. All his lesions healed, including an old sinus over the right scapula, and his general condition, mental and physical, improved so much that he has returned to his home and has at once obtained a better post.

I should like to draw special attention to the general improvement in the condition of patients under the light bath. There is a feeling of well-being, the patients become brighter and more active, the skin generally becomes clearer, and they put on weight. Examinations of the blood show that there is in many cases a marked increase in the small lymphocytes. The listless, apathetic lad or girl begins very shortly to take an interest in his or her appearance, and there is an alertness about these patients which has greatly impressed both the medical and nursing staffs attached to my clinic.

At first we had to start in a very humble way with one 25-ampère lamp, but we were soon convinced of the value of the light bath and a 50-ampère lamp was installed. We have had 32 cases under treatment, and hope to increase our installation at an early date.

The cases described show the remarkable efficacy of the general treatment, but we have also observed that the light bath treatment intensifies the effect of the local action of concentrated light on the lupus lesions and materially shortens the time required for effecting a cure. We find we can get our patients well bronzed in about a fortnight. In some cases, particularly in girls, there is a rather acute light dermatitis with vesication and free desquamation, but this is of no moment.

With regard to the duration of the treatment, our present experience seems to show that in three to five months we are able to obtain a satisfactory result. We think it may possibly be advisable to repeat the course after an interval, and on that we should like to know the experience of Professor Reyn, who has had his cases longer under observation.

Conclusions.

1. We must carefully distinguish between the local application of concentrated light to lesions and the light bath.
2. The best results in the treatment of lupus vulgaris are obtained by a combination of local and general treatment. The local treatment is carried out by the application of concentrated actinic light to the lesions. The light bath is the exposure of the nude body and limbs to the rays of a large arc lamp.
3. The best illuminant is a large carbon arc working at 50 ampères. The spectrum of such an arc more nearly approaches that of the sun than that of any other lamp. The carbon arc must not be enclosed; an envelope of any kind cuts out some portion of the rays.
4. The amount of pigmentation is an index of the reaction of the body to the radiation. We do not, however, imply that the production of pigment is the cause of the improvement in the general health of the patient or of the healing of his lesions. So far as we know at present it is merely an index.
5. As a general rule the more the patient's skin becomes pigmented the better the results.
6. We feel justified in stating that 90 per cent. of all cases can be cured by combining the light bath with local phototherapy. The efficacy of local treatment is intensified by the application of light to the whole surface.
7. In addition to the healing of tuberculosis skin lesions, sinuses, etc., the patients increase in weight, their general health improves to a remarkable degree and their mentality is most favourably influenced.
8. It appears likely that in certain subjects the treatment may require repetition at intervals.
9. Apart from tuberculosis the light bath can be recommended as a general tonic.

I have to acknowledge my indebtness to Dr. W. J. O'Donovan, my chief assistant, and the nursing sisters in the Light Department at the London Hospital for their enthusiastic co-operation in the development of a branch of therapeutics which for all time must be associated with the name of Neils Finsen.

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DISCUSSION.

Professor S. RUSS (London) said that the address of Professor Reyn had been extremely interesting, for it was a record of work carried out in the Institute at Copenhagen bearing the name of Finsen, the originator, in a scientific sense, of heliotherapy. Professor Reyn's clinical observations served to clear up some issues which were of rather long standing as regards their solution, and it appeared that just as in the domain of x rays so in the régime of the visible and ultra-violet radiation it was necessary to refer very explicitly to the particular radiation which was in question. This explicitness was now possible, for the wave-lengths of all the radiations in medical use had been measured by the physicist, and there was much to be said for referring to the rays used in terms of their wave-lengths. The difficulty up to quite recent times had been to know which portions of the spectrum had been responsible for the clinical effects observed, but the ground was gradually becoming cleared, and it now appeared to be quite possible to assign many of the reactions of the tissues to radiation of specifiable wave-lengths. For most medical purposes it was sufficient to consider that region of ultra-violet radiation which extended on the short wave-length side of violet light—namely, λ = 3,800 A.U. down to about λ = 2,000 A.U. Experiment showed that the wave-lengths ranging from 3,000 to 2,000 A.U. were very easily absorbed by vegetable and animal tissues, causing in the process of absorption some very marked actions, extraordinary germicidal action, and also causing marked pigmentation of the human skin. Such radiation as he had mentioned was very easily absorbed by the tissues; practically speaking, no radiation comprised between 3,000 and 2,000 A.U. could penetrate as much as 1 mm. of the skin. If, then, it was attempted to explain the beneficial effects of ultra-violet radiation in surgical tuberculosis in regard to this group of wave-lengths, there were very serious obstacles to overcome. There were still the group of wave-lengths ranging from 3,800 to 3,000 A.U., and he thought that there was very considerable evidence to show that to this region, together with the visible region, they must look for the effective part of ultra-violet radiation in the form of therapy now under discussion. The reasons which could be advanced for this view were as follows:

1. The full radiation from the sun or from artificial scurces was beneficial.
2. The radiation filtered of the very short wave-lengths—namely, those less than 3,000 A.U.—was still beneficial.
3. The radiation filtered still further so as to exclude wave-lengths shorter than 3,800 A.U. was not nearly so beneficial.

There was little doubt, he thought, that this conclusion had been delayed by the finding that the patients who pigmented readily were those who reacted favourably to this form of treatment; it seemed only natural to go one stage further and say that the process of pigmentation was a necessary part of the treatment, and that the rays which caused the pigmentation were the beneficial ones. In the light of subsequent work it seemed that this assumption was unjustified and that the observation must be taken, perhaps, as a useful one, but not one which could be called interpretative.

Sir STCLAIR THOMSON (London) described his visit to the Finsen Institute and his observations of the results obtained in tuberculosis of the larynx. His own results, from sanatorium treatment, showed 25 per cent. of cures from silence, whispers, and the galvano-cautery. In Copenhagen he heard that they secured 50 per cent. of arrests, and he thought this was very possible as, there, they employed local measures in addition to the arc lamp baths. He asked for further direction as to technique and precaution. He thought it well, however, to point out that tuberculosis in the larynx was, next to meningitis, the most dangerous complication of pulmonary tuberculosis. Of some 500 cases of laryngeal disease he had treated in ten years, no less than 75 per cent. were dead. They were dead from their pulmonary disease. It was, therefore, useless to hope for a large proportion of cures of laryngeal tuberculosis; the laryngeal invasion showed an acute primary infection or a lowered resistance. Still, the light baths might secure better general and local results, and he welcomed it as a promising help.

Dr. J. M. JOHNSTON (Tor-na-Dee Sanatorium, Aberdeenshire) said that he wished to refer only to the use of carbon arc lamps in the treatment of certain tuberculous conditions. One of his colleagues had visited Copenhagen last year and was so impressed with the results of the treatment of painful tuberculous laryngitis by exposure of the body to the light of the carbon arc lamps that it was decided to put in an installation at Tor-na-Dee Sanatorium. This was done recently, but so far he had treated only two patients, suffering from painful tuberculous laryngitis. In both, the laryngeal disease was severe and there was great pain, preventing the patients from taking sufficient nourishment. In the first case relief of pain was obtained in two weeks, and although the treatment was abandoned at the end of that period owing to the occurrence of pyrexia, there had been no recurrence of the pain in the larynx for four months. The patient had advanced pulmonary disease which was progressive, and the outlook was very bad, but at all events the carbon arc lamp treatment had given her comfort and had thereby prolonged her life considerably. The other patient had moderate pulmonary disease and was almost afebrile, but he had an exceedingly painful larynx and was sent to Tor-na-Dee for treatment by the carbon arc lamps. He had been having large quantities of morphine together with local anaesthetic insufflations, sprays and lozenges, without which

he was unable to swallow anything. The carbon arc lamps gave no relief at first, but at the end of six weeks' persistent treatment the larynx was practically painless and the use of all local anaesthetics and hypnotics had been omitted. There was no fever during the treatment, and the patient improved generally, but Dr. Johnston could detect no change in the pulmonary physical signs. The patient left the sanatorium about three months ago and up to the present there had been no return of the pain and his general condition as well as the pulmonary and laryngeal lesions had improved steadily. Dr. Johnston had also used the carbon arc lamps in a few cases for the treatment of tuberculous sinuses which were not healing under other methods of treatment. He referred especially to the case of a young man who was riddled with tuberculous foci—four large sinuses over four ribs on the right side in front, two sinuses connected with the glands in the right axilla, one on the right side of the neck, one on the left thigh, both from glands, an abscess over the right sacro-iliac joint, and a number of sinuses, both dorsal and plantar, on the left foot. The patient had also a mild lesion of the right upper lobe and was greatly emaciated and constantly febrile, and the prognosis looked very grave. He has been treated with the arc lamps for the last four months with remarkable results, for all the foci had healed except the foot, which, however, had much improved; his general condition was excellent and he was afebrile. This patient had been treated by various methods in several institutions for a long time without any improvement; and he had been at Tor-na-Dee for a considerable time prior to the commencement of the arc lamp treatment and was not doing well. Dr. Johnston felt certain that his present state was due to this method of treatment. His experience was very limited as yet, but he could not help feeling that there was a very definite sphere of usefulness for this method of treatment in a proportion of cases of tuberculosis. In painful tuberculous laryngitis he did not think that heliotherapy would give as good results as the arc lamps, especially if the lungs were gravely involved. In this country, where sunshine was somewhat fickle, especially in winter, it was easily conceivable that, in a proportion of patients suffering from so-called surgical tuberculosis, regularly applied treatment by the carbon arc lamps might give better results than irregularly applied heliotherapy.

DISCUSSION ON THE PRESENT POSITION OF THE SURGICAL TREATMENT OF PULMONARY TUBERCULOSIS.

OPENING PAPER

BY

J. GRAVESEN, M.D.COPENHAGEN,

Medical Superintendent, Vejlefjord Sanatorium, Denmark.

Introduction.

THE particular kind of surgical treatment which has so developed as to become a lasting adjuvant to the present aid against unilateral, or chiefly unilateral, cases of pulmonary tuberculosis is based upon the experiences gained by the work with artificial pneumothorax. The principles of this method have put an end to all previous devices (incision with drainage of cavities, excision of lung lobes, etc.), which, therefore, need not be mentioned.

The immense amount of work that has been done on pneumothorax treatment, its principles and technique, is evidence of its value. Its value, however, is not to be judged merely from the point of view of the results of cure recorded by the many different authors all over the world. The results may often seem rather doubtful, or at least somewhat modest. But it has to be remembered that, besides the mere results, artificial pneumothorax has brought about a considerable progress in our knowledge with regard to many questions the importance of which had not hitherto been sufficiently realized. Light has been thrown upon many anatomical, physiological, biological, diagnostic, and therapeutic problems through the experience derived from the method of measuring the endopleural pressure, from the use of x rays, and from many other additional means developed along with artificial pneumothorax.

When considering the results of cure by this treatment it should be borne in mind that artificial pneumothorax and subsequent methods are being used only in those advanced cases (third stage) which have a very poor prospect by the ordinary régime, even with the addition of specific remedies. This fact, of course, must be remembered before any attitude is taken towards the question under discussion. Moreover, it should be realized that artificial pneumothorax, as well as collapse operations, depend to a very great extent upon a very scrupulous technique and a thorough familiarity with all the indications and complications. Undoubtedly this fact explains many of the very different opinions published by various authorities on the methods in question.

Above all, the results of artificial pneumothorax have to be judged according to the anatomical and physiological possibility of deriving full benefit from the treatment. In order to settle the actual results and to justify further—and more risky—methods in cases where the induction of pneumothorax is technically impossible, and therefore unsuccessful, it is necessary to classify the cases with regard to the influence exerted by the presence of pleural adhesions.

Such classification has been utilized in the largest series of cases yet published on this subject—namely, that of Saugman[1] (Vejlefjord Sanatorium, Denmark). A comprehensive view of these 211 third-stage cases (two to twelve years after discharge) shows a lasting positive result of the pneumothorax in 38 per cent. of all cases in which a pneumothorax of any noteworthy extent could be established. A comparison of this figure with the percentage of cure, 11 per cent., in cases in which pneumothorax had to be given up owing to more or less universal adhesions, gives a fair credit to artificial pneumothorax.

The further classification of the former group explains why the results are not still better. The injurious influence of adhesions even in some of the cases in which pneumothorax is practicable is apparent from the following tables showing the condition of the patients three to thirteen years after discharge.

GROUP I.—*Cases with Complete Pneumothorax without Adhesions.*

Able to work	33	= 70.2	per cent.
Not able to work	1	= 2.1	" "
Died from tuberculosis	11	= 23.4	" "
Died from other causes	1	= 2.1	" "
Unknown	1	= 2.1	" "
	47		

GROUP II.—*Cases with Complete Pneumothorax but with Localized Extended Adhesions.*

Able to work	14	= 33⅓	per cent.
Died from tuberculosis	28	= 66⅔	" "
	42		

GROUP IIIA.—*Cases with Incomplete Pneumothorax but with Larger Adhesions.*

Able to work	5	= 11.1	per cent.
Died from tuberculosis	39	= 86.7	" "
Died from other causes	1	= 2.2	" "
	45		

GROUP IIIB.—*Cases with Universal Adhesions—no Pneumothorax Practicable.*

Able to work	9	= 11.8	per cent.
Not able to work	3	= 3.9	" "
Died from tuberculosis	63	= 81.8	" "
Unknown	2	= 2.6	" "
	77		

These tables* clearly show how frequently the adhesions handicap the full benefit of artificial pneumothorax and what excellent results that treatment would be able to give if the injurious influences of the adhesions could be removed. It is no wonder, therefore, that somewhat extreme attempts have been made in cases of adhesions to provide for the diseased lung such conditions of lung collapse as are present in an adhesion-free pneumothorax. I cannot mention here all of the numerous suggestions made by different authors towards this end, as a good many of the suggestions have

* The statistics in these tables are worked out on cases treated before any additional operation had been undertaken.

no practical value at the present state of development. I consider it my task on this occasion to sketch the main lines upon which, according to the experiences gained by ourselves and others, we are now working at the Vejlefjord Sanatorium.

General Remarks on Indications.

When a case of advanced tuberculosis does not show any improvement or any hope of lasting cure by ordinary sanatorium treatment, and when other special remedies are out of the question or have been tried in vain, then only do we venture to consider whether the case is fit for collapse treatment. This is settled in accordance with the rules which for many years have been laid down by the leading pneumothorax experts. If the decision is taken in favour of lung collapse, this is always tried at first in the most ideal method available—namely, by artificial pneumothorax. Whether this method can be carried out or not can only be fully ascertained by a considerable technical and clinical experience.

The result of such careful attempts is the only means by which the case can be classified into one of the three groups mentioned above. In many cases a prolonged observation is necessary, and transitional cases are common. Nevertheless, the three groups of cases form a natural index for our further discussion, in which the question to be solved is: How can we provide the best possible conditions for the single cases belonging to each one of the three groups?

I. *Cases with Complete Pneumothorax without Noteworthy Adhesions.*

Cases of this group, when not complicated with active disease in the other lung or in any other organ, generally prove successful, showing a marked improvement of the general condition and disappearance of the local symptoms (cough, sputum, tubercle bacilli). Examination by the stethoscope and by *x* rays shows a complete lung collapse, with an endopleural pressure of zero.

Provided no complication occurs, no further operation is done. In such a case the optimum pressure and the length of interval between the insufflations are settled according to the clinical observations. The time when the patient is allowed to start work and continue the treatment as an out-patient is decided according to the circumstances of the case. The duration of the treatment is fixed individually; but as a rule the pneumothorax is maintained for at least three to five years in order to avoid relapse. While the treatment is being discontinued the patient is kept under close observation (preferably as an in-patient) so as to enable us to re-establish the pneumothorax, if there is any sign of recurrence, before the pleura is obliterated by the adhesions which unavoidably arise after a long pneumothorax treatment.

Should any complication occur, particularly a pleuritic effusion in the pneumothorax, special care is taken to avoid any injurious effect. By frequent fluoroscopic examinations of the patient in different positions of the body it is observed whether any secondary adhesion of the lower lobe is threatening complete collapse. If this—or any other local or general symptom—indicates an evacuation of the exudate, that operation is performed in combination with successive insufflations according to the special technique worked out for this purpose. Thus attended to, effusions do not ordinarily influence the result of the treatment.

This last point leads us to a digression which, however, is of much importance—namely, the bearing of the pneumothorax treatment upon the treatment of ordinary pleurisy with effusion. The facts revealed to us from pneumothorax experience have forced us to revise the indication as well as the technique of aspiration in such cases.

We have adopted, as the normal method for evacuation of pleural effusions, a replacement of this with an artificial pneumothorax. This method presents very beneficial conditions, not only in cases with serous effusion, but also in cases of empyema. Even when mixed infection (for example, pyopneumothorax) was present we have been able by this means to treat purulent effusions without operations which result in a chronic fistula with continuous or periodical discharge. Besides the great technical and clinical advantages, this method is of prophylactic value in cases of advanced lung affection, for which a continued lung collapse might later on be demanded. The addition of insufflation to the ordinary aspiration has in such cases checked the development of adhesions and thus we have been able to introduce pneumothorax treatment successfully before unavoidable adhesions had been formed.

II. *Cases with Complete or Almost Complete Pneumothorax but with Localized, Extended Adhesions—Thoracoscopy with Cauterization.*

In continuation of the cases of the former group we find here a certain number deriving the full benefit of artificial pneumothorax in spite of adhesions visible on the screen. In such cases we do not consider any further operation justified. On the other hand, if in spite of the establishment of the largest possible pneumothorax continued observation shows that the result is a failure, we endeavour to have the adhesions removed so as to neutralize their injurious influence. Thus far several different methods have been published for this purpose. Having challenged the more or less risky operations which have been tried, we find that the only method of endopleural operation which we can recommend is the one published by Jacobaeus (Sweden). This method has a double value—namely, diagnostic and therapeutic.

Although the *x*-ray examination in some cases affords a fairly clear diagnosis of the endothoracic conditions, the introduction of thoracoscopy by Jacobaeus has enabled us to obtain a direct localization, which has often corrected or at least supplemented the picture presented to us by mere *x*-ray examination. With sufficient practice it is possible to obtain a surprisingly large field of view, and it is relatively easy to see the existing adhesions and their attachments to the lung and to the chest wall.

This diagnostic method has proved its particular value since Jacobaeus* was led by his experiments to work out a method of removing the adhesions under the guidance of the thoracoscope. By means of a platinum wire at the end of a long metal rod inserted into the pneumothorax cavity through a separate cannula Jacobaeus found it possible in certain cases to cauterize through the adhesions, and thus to secure the complete collapse of the lung.

This method has been adopted by us since 1918. Our experiences concur with those published by other authors who took advantage of Jacobaeus's happy idea. Thus far we feel justified in stating with Jacobaeus that "although it has been impossible by this method to obtain as high a percentage of clinically improved cases as in cases of simple pneumothorax without adhesions, the procedure is of permanent value in a limited number of pneumothorax cases with string-like or membrane-like adhesions."

In order to ascertain whether this method can be used in a particular case put before us we perform a thoracoscopy. If we then find the case to fulfil the conditions for cauterization, or, at least, to justify an attempt, the operation is done at the same sitting. In some cases we find it very easy during one short sitting to cut the adhesion; in other cases a larger adhesion or a system of adhesions is difficult to reach and so difficult to sever that we have to operate in two or more sittings. In some other cases we have to give up the attempt owing to technical difficulties; and finally, in some cases mere thoracoscopy immediately reveals that the operation should not be tried at all.

Apical adhesions which kept the lung tied up to the cupola were usually difficult to reach; lateral adhesions, on the other hand, could easily be dealt with when they had been extended to the highest possible degree by the pneumothorax. String-like, hour-glass shaped, or membranous adhesions of considerable thickness were severed without much difficulty, and also basal adhesions when properly extended. On the other hand, we did not consider it advisable to enter upon the cauterization of surface adhesions, as the cauterization of lung tissue may involve the risk of haemorrhage and the opening of tuberculous foci and cavities with a consequent infection of the pleura.

This last complication of the operation is the most serious one which so far we have experienced. Other authors have published cases of more or less profuse haemorrhage from the burnt-off stumps; this complication should always be kept in mind, and, if it occurs, should be treated according to the technical rules (cauterization of

* For further information about the indication, technical details, complications, etc., the reader is referred to Jacobaeus's recent publications—for example, in *Surgery, Gynecology and Obstetrics*, June, 1921, pp. 493-500; the *American Review of Tuberculosis*, vol. vi, No. 10, 1922. See also BRITISH MEDICAL JOURNAL, November 25th, 1922, p. 1043, and December 2nd, 1922, p. 1091; *Tubercle*, vol. i, No. 1, and vol. ii, No. 9; *Acta Chirurgica Scandinavica*, 1921, i, No. 6; 1923, iv, No. 5-6.

the bleeding spot or high endopleural pressure, established by injection of saline solution into the pneumothorax). One of the reasons why we have not observed any bleeding is probably because we always use a weak, redly glowing galvano-cautery. This precaution makes the operation somewhat longer, but at the same time safer.

In six of our cases a serious empyema developed after the operation; the cause of this complication was almost always to be found in the attempt to cauterize rather extensive adhesions. Simple exudates were observed after the operation in six cases, but had no injurious influence.

It seems evident to us, and also from the experiences published by other authors (up to date Jacobaeus himself has used his method in not less than 90 cases), that none of the technical or clinical complications is of such grave importance as to warrant abandoning the method in suitable cases. But it is also true that the operation demands a good deal of practice in handling the instruments and in judging the different conditions which may be found. The common criticism of the method—referring to the difficulties of the technique—is, however, in our opinion to be explained by lack of proper practice. Another criticism of the method is the comparatively narrow field of indication; but, as a matter of fact, this circumstance should not be allowed to condemn the method in really suitable cases.

Our work on these lines has obtained the following results:

Out of a still larger number of cases, in which thoracoscopy has been used, cauterization was performed or tried in 35 cases. Cauterization was technically successful (that is, sufficient for a complete collapse of the lung) in 22 cases; 17 of these derived a lasting clinical benefit from the operation (disappearance of bacilli and symptoms). In 13 cases the operation was given up after an incomplete cauterization; some of these cases, too, showed improvement after the operation.

Although we feel justified by these results in recommending the method, we are still confronted by a class of cases belonging to this group which are not suitable for the application of the method. In such cases we usually try for a longer period the most energetic pneumothorax technique that is practicable, and often we acquiesce in a less complete collapse, obtaining only relative results. If, however, further observation shows that the prospect of lasting improvement in such a case actually depends upon further surgical treatment we consider the methods mentioned under the next heading.

In two cases we have tried to provide the complete lung collapse by means of a pleurotomy with manual or instrumental loosening of such extended adhesions as could not be cauterized. But in both cases such serious complications (post-operative haemorrhage and open empyema) occurred, as to necessitate our abandoning these operations. The same experiences are published by several other authors with regard to pleurotomy.

III. *Artificial Pneumothorax not Possible to any Satisfactory Degree: Thoracoplasty.*

Although it may be true that for Jacobaeus's method there is left only a narrow field of real usefulness, a glance at Groups IIIA and IIIB of the above tables (p. 506) reveals a large number of cases entirely lacking the lasting benefit of artificial pneumothorax. It will be easily understood that a clinical observation of the facts expressed by such statistics has prompted our efforts to introduce in our treatment such operations as had been worked out as substitutes for artificial pneumothorax. As our work with the thoracoplastic operations has proceeded we have experienced to a fair extent the advantages as well as the drawbacks involved in these methods. The sum of our experience is, however, in absolute favour of thoracoplasty, provided the operation is used in well selected cases and every attention is paid to the physiological and technical demands.

It has been our aim to select the most useful modifications published by different authors, especially on the Continent and in our brother countries in Scandinavia, and thus to work out a technique which combines the advantages of the different methods. As a whole we have followed Sauerbruch's[2] technique, which embraces the largest fund of theoretical and practical experiments published on this subject. But also Brauer,[3] who was the pioneer in solving the problems of a successful thoracoplastic operation, has a great share in the line of work adopted by us. Of the Scandinavian authors we are obliged to mention P. Bull,[4] and Jacobaeus and Key,[5] whose recent publications are of great value to the discussion.

Since 1916 we have treated 110 patients with thoracoplasty: 105 of these were operated upon for pulmonary tuberculosis, 3 for old tuberculous empyema with external fistulae, and 2 for bronchiectasis. Previous to the 105 cases of pulmonary tuberculosis on which our experience in this connexion is based, we had experimented with the earlier methods of thoracoplasty (Brauer, Friedrich) carried out by surgical colleagues in other hospitals. The results of four such cases, however, hardly justified further experiments on the same lines; in all the cases but one the effect failed, and in the one positive case the condition of the lung and heart functions was considerably impaired. For several years, therefore, no thoracoplastic operation was performed on our patients. When the further development of the technique had provided a better prospect, the method was again taken up for renewed study, and in contrast to the previous attempts we were now enabled, by the installation of a full surgical outfit at our own sanatorium, to carry out the operation ourselves without any discontinuation of the ordinary sanatorium treatment of our patients. We emphasize this advantage as a very important one for obtaining the best possible results.

The indication for thoracoplasty arises when, in cases fit for lung collapse treatment, the careful attempts of artificial pneumothorax have actually failed. Before entering upon this alternative operation, however, we always revise the indication very carefully, as we believe a considerable restriction to be necessary when proceeding from the question of artificial pneumothorax to that of thoracoplasty. On account of the greater risk and the irreparable conditions involved in thoracoplasty, a more pressing need of collapse of the diseased lung and a more reliable condition of the better lung are demanded than in regard to artificial pneumothorax alone. Nevertheless, the striking examples of good results, even when the better lung has been considerably affected, have had the result that occasionally we have felt justified in giving such patients as might gain a little and could lose nothing a chance by the operation. It cannot, however, be denied that this indication as a whole acts unfavourably upon our statistical results. The general condition of the patient and the complication with other localizations of tuberculosis or other diseases also seem to us to claim more deliberation than with regard to artificial pneumothorax lest thoracoplasty should get a bad reputation.

Having settled the indication for a particular patient we come to the next question to be solved—namely, the working out of the plan of operation to be followed in this individual case. It is a common statement, with which we cordially agree, that the chief problem regarding plastic operation is to individualize the operation according to the peculiarities of the single case. The deliberations in this respect are particularly concerned with two questions: (1) Should a partial or a complete thoracoplasty be done? (2) Should the operation be performed in one, two, or more stages?

(1) A partial thoracoplasty may be considered sufficient either when the affection (for instance, a cavity) is localized to a limited area of the lung or when a partial pneumothorax has been so established as to provide collapse for the upper or, more frequently, the lower part of the lung.

In a few cases where the disease was well localized to a certain lobe we were able to secure a full effect by an operation which left some of the ribs intact. In three cases of large basal cavities the upper two or three ribs were not resected, and the result of these operations proved very satisfactory. In the more frequent cases of apical cavities, however, we do not consider it safe to let the lower part of the lung remain expanded, as a post-operative aspiration of sputum into the moving lower lobe is likely to produce pneumonia or a secondary tuberculous affection.

If only the lower lobe is immobilized by a partial, basal pneumothorax it may be advisable to abstain from complete thoracoplasty by leaving the lower ribs intact. This combination of a partial pneumothorax and a partial thoracoplasty formed the plan of operation in three of our cases.

In two of these, however, the pneumothorax had to be cancelled soon after the operation, as the continuation of insufflations was not possible. Nevertheless, the result remained good. In the third case post-operative exudate developed inside the pneumothorax and caused an expansion of the soft part of the chest wall, thus hindering the collapse; the patient died a few months later.

We have come more and more to the conclusion that in cases of universal affection of the lung a partial and ineffective pneumothorax should be discontinued in favour of a complete thoracoplasty. The plan of a complete operation, however, has often to be modified according to the extent and to the special localization of the disease. In the case of a particular lobe which involves the main part of the affected tissue the removal of the ribs should be done to a larger extent. If, on the contrary, the upper or lower lobe respectively is only slightly affected, the plan of the operation indicated is a relatively slight resection corresponding to the better parts of the lung. In the same way a universal affection of the lung may need a different degree of universal collapse. In cases of large cavities and serious disease all over the lung, a more radical removal of all the ribs is indicated. For a universal, but nowhere very destructive, chiefly fibrotic affection a smaller resection (after Wilms's method) may be sufficient for an effective collapse.

(2) The problem of whether a complete thoracoplasty should be performed in one, two, or even three stages, has caused a good deal of discussion. We have been wavering hither and thither on account of the different experiences gained during our work with the operations. Our present standpoint is to individualize in this respect too. In making our plan of operation we consider the general condition of the patient as well as the condition of the lungs to be the deciding factors in this respect. If the patient is a tall person with strongly adherent muscles, causing difficult and violent manipulation during the operation, this should always be done in two stages. On the contrary, a lean person enjoying fair general health may very well be operated upon in one stage. A weakened and intoxicated patient with a rapid pulse is always operated on in two stages. A doubtful condition of the "good" lung is in favour of two stages, as a gradual collapse of the diseased lung is likely to be tolerated better in such cases than a sudden one.

If we feel any doubt as to the decision we consider the two-stage operation to be less risky. In some cases we leave the question open until, during the operation itself, it is seen whether the patient is certain to tolerate the completion of the operation in one stage.

Having settled the plan of operation for a particular case according to the above lines, the details of the technique form the next problem to be solved. Very careful attention to all the special details of the operation and the post-operative treatment is of great importance. For further information in this respect the reader is referred to an article by Saugman in *Tubercle* (1920, vol. i, No. 7),* in which a full description of our technique is given. Since that article was published no noteworthy modification has taken place in our technique, except with regard to the anaesthesia. In addition to the local anaesthesia with novocain-adrenaline, which we are now less inclined to use in as large doses as recorded in the article mentioned, at the end of the operation (when the more painful resection of the upper ribs begins) we administer a light ether anaesthesia, pushed far enough to neutralize the pain but not to abolish the cough reflex. This modification, when properly administered, does not cause any serious complication. At the same time it has made the operation less feared by the patients; it also assures the operator of more convenient conditions during the most difficult part of the operation.

A critical survey of our results with thoracoplasty shows the following figures: Death from the operation occurred in 9 cases. Of the remaining 96 patients, 64 obtained a positive result (43 were relatively cured or much improved, 21 improved); 2 of these patients died later on of epidemic influenza; 32 patients did not derive any benefit from the operation, and the majority of these cases have since died. These figures may be tabulated as follows:

Positive results	60.9 per cent.
Negative results	30.5 ,, ,,
Operation mortality	8.6 ,, ,,

In 41 cases the tubercle bacilli disappeared permanently from the sputum.

Still greater interest is connected with the following figures, showing the fate of 69 patients discharged more than two years ago, after thoracoplasty. From two to seven years after the operation the condition of health was reported as follows (all cases, including those of death resulting from the operation, are recorded):

Fit for work	31 = 44.9 per cent.
Unfit for work on account of tuberculosis	7 = 10.1 ,, ,,
Died of tuberculosis	29 = 42.1 ,, ,,
Died from other causes	2 = 2.9 ,, ,,

These results, compared with those recorded in the former tables (p. 506) have led us to the conclusion that although a greater risk and a smaller result are to be expected from thoracoplasty than from successful artificial pneumothorax, the former operation results in a great improvement in the prognosis in such cases as are deprived of the effect of the pneumothorax treatment.

IV. *Cases of Insufficient Collapse with Simple Thoracoplasty.*

An additional group of such cases has still to be considered. The fullest possible extension of resection of the ribs from the posterior incision (Sauerbruch's "hook incision") might fail—particularly in cases of large apical cavities we have found the collapse of the lung to be insufficient. In such cases we have added to the plan of operation a resection of the anterior ends of the upper ribs (except the first, which is usually inaccessible for removal from the front aspect). This resection may be done either together with the second stage of the posterior operation or as a separate third stage of the operation. Even when this precaution is taken complete collapse was, in a very few cases, not yet established; *x*-ray examination still showed a cavity, though considerably diminished; the discharge of sputum with tubercle bacilli continued.

Influenced by such observations we have in a few cases added to thoracoplasty an extrapleural apicolysis from the anterior incision. In two of the cases the cavity thus produced was plugged with gauze and was allowed to heal gradually by granulation and retraction. In one case the cavity was filled with fat, transplanted from the abdomen of the patient (Tuffier, Bull). Of the two former cases, in one we did not succeed in causing the bacilli to disappear from the sputum (the patient died very soon afterwards of rapid development of the disease), whereas in the other case a positive result was obtained—the bacilli disappeared, but an influenzal pneumonia later on handicapped the effect. In the case in which fat-transplantation was performed in addition to the thoracoplasty, the tubercle bacilli disappeared and the patient is practically cured.

In one of our cases, which is not included in the above figures because of its unique position, we accomplished a satisfactory collapse by an apicolysis only (through an anterior resection of the second rib), together with transplantation of fat into the artificial extrapleural cavity. The disease (small cavity) was in this case so well localized to the apex that it was considered possible to avoid the extensive resection of ribs. The patient got on well, the sputum and bacilli ceased, but the lasting result is still uncertain as the patient was discharged only very recently. Cases like this are very rare indeed, and we do not believe that this method has any large field of indication compared with thoracoplastic resections. By anticipation we have so far kept aloof from the method of apico- and pneumo-lysis with the modification of plugging the extrapleural cavity with paraffin (Baer). Neither has phrenicotomy (recommended by Sauerbruch as a preparatory procedure for thoracoplasty in order to supplement the effect of that operation) so far been employed by us.

I cannot close these remarks without a few words in commemoration of my great teacher and friend, the late

*A later article by Gravesen is published in *Tubercle*, 1921, vol. ii, No. 9.

Professor Chr. Saugman. According to the original plan Saugman himself should have enjoyed this opportunity of giving an account of the studies here presented, in the development of which he has been the great master. His death in February of this year has thwarted this plan, to which he had been looking forward with much delight. His enormous energy, his profound knowledge, his clinical capacity, and his unique personality will be missed on this occasion, as it is missed in all the spheres of his great life work.

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[1] *Lancet*, 1920, ii, p. 685. [2] Sauerbruch: *Chirurgie der Brustorgane*, I Bd., Berlin, 1920. [3] Brauer, Schroeder, and Blumenfeld: *Handbuch der Tuberkulose*, Leipzig, 1919; see also *Beiträge zur Klinik der Tuberkulose*, Bd. 51, 1922. [4] *Lancet*, 1920. [5] *Acta Chirurgica Scandinavica*, Supplement iii, 1923.

DISCUSSION.

Mr. J. E. H. ROBERTS (London) said it was not necessarily true that bad results were due to adhesions, but infection was more virulent in cases where adhesions were strongest. He had lately modified his views regarding the Jacobaeus operation for cauterizing adhesions. He believed that in many cases it was a good procedure, but in others the adhesions were so firm that thoracoplasty had to be performed. He urged the importance of careful preparation of a case to be subjected to thoracoplasty. He preferred not to rely on a local anaesthetic; gas and oxygen was the anaesthetic of choice. The after-treatment was as important a factor as the operation itself. The chest wall should be immobilized by strapping for at least ten days, and subsequently proper physical exercises should be practised to prevent scoliosis.

Dr. VERE PEARSON (Mundesley Sanatorium, Norfolk), in discussing the choice of patient for artificial pneumothorax, urged that a fair trial of sanatorium treatment should first be given. He thought it unwise to refuse to operate because there was a possibility of adhesions being present. He maintained that the ordinary physical signs were more important than *x*-ray evidence. If a case was deemed suitable for thoracoplasty this operation should not be delayed too long.

Dr. L. S. T. BURRELL (London) said that one great principle in the treatment of tuberculosis was rest of the diseased part, and the best way to rest a diseased lung was to induce an artificial pneumothorax. He thought that this treatment should be given more often and in an earlier stage of the disease than was usually the case at present. When treating a patient by artificial pneumothorax he kept him in bed at absolute rest until the temperature had been normal for at least a month, and then allowed him to begin to get up and do a little more each day until he was fit to be up all day. He was then able to begin training, and a sanatorium was the best place for him; he should stay there until all symptoms had gone and he was able to lead a normal life without fatigue. Then if necessary he returned to work, the pneumothorax being kept up for two or three years, when the lung might be allowed to re-expand gradually. The principle of this treatment was rest of the body and of the diseased part, followed by training of the body but rest of the diseased part. The importance of rest could not be too strongly emphasized. When a patient contracted consumption he was in for a big fight, and the result depended very largely upon himself. The wise man would avoid all exertion and lead the quietest of lives for at least two years.

It followed that if both lungs were involved this treatment must be modified, and this was one reason why he advocated its early adoption. It might be said that the unilateral cases were just the ones that tended to recover with or even without any treatment, but it must not be forgotten that every case started as a unilateral one. The question was, did pneumothorax tend to prevent the spread of the disease? He suggested that it undoubtedly did so. Of his first 150 cases 45 had disease in one lung only, and of these 32 had lost their tubercle bacilli and symptoms for at least the last six months, 9 were much better, and 2 were dead. In 26 cases the other lung was affected, though less than one-third of it, and of these only 6 had lost the tubercle bacilli and symptoms for at least the last six months, and 8 were dead. What, one asked oneself, would have been the result if these 26 had had a pneumothorax earlier? Another reason for inducing a pneumothorax in earlier cases was that one was less likely to find adhesions or adherent pleura, and although these might be dealt with by one of the methods described by Dr. Gravesen, the position of the patient was much more grave. Thoracoplasty meant the permanent collapse of one lung; it was accompanied by a good deal of shock, and there was a considerable mortality. What was the risk in artificial pneumothorax? He had treated 294 patients by this means and had put a needle into the pleural cavity over 4,300 times, with one fatality. He therefore agreed with Dr. Gravesen that artificial pneumothorax should be tried first; failing this it might be possible to divide the adhesions, and he thought the method described by Professor Jacobaeus was the best, although, in his own experience, very few cases were suitable. Thoracoscopy, however, was often of great value in diagnosis, and was free from pain or danger. Division of adhesions by operation was, in his opinion, distinctly dangerous. Let them not use the word "cure." He had spoken strongly in favour of treatment by artificial pneumothorax, but of the consumptives who had come to his out-patient department during the last five years he had advised pneumothorax treatment in only 15 per cent. In other words, he had recommended other treatment in 85 out of every 100 cases. However, the more he saw of the disease the more convinced he was that the value of pneumothorax treatment was not recognized, and should be more often used. It was not a cure, but it might be said that it was a very great advance in treatment. When a so-called cure came before the public they knew what it meant—many pitiful letters and painful interviews—and it was their sad duty to say that there was no cure. Lastly, he asserted that success in treatment depended on strict attention to detail. After a few months' practice anyone could induce an artificial pneumothorax and give the refills, but only experience could tell how much gas to give and when to give it, how much exercise to allow and how much rest. Each patient must be treated as an individual, and given individual treatment.

Mr. A. TUDOR EDWARDS (London) said that he proposed to pay attention to two methods only for the surgical treatment of pulmonary tuberculosis. The direct treatment of pulmonary tuberculosis—namely, drainage of the cavity—was adopted only to be rapidly abandoned, as the abscesses continued to discharge through the bronchus with the superadded complication of a bronchial fistula on the chest wall. Successful attempts had been made in rare instances with a view to total extirpation of the infected focus, but their scope was limited and their technical difficulty and the resulting shock were prohibitive. The general acceptance of the beneficial effects of artificial pneumothorax had considerably influenced the position of surgery with regard to pulmonary tuberculosis. The tendency of surgery was to amplify or replace artificial pneumothorax, where owing to mechanical factors the collapse was either incomplete as a result of band-like adhesions, or impossible from the presence of generalized surface adhesions.

Where band-like adhesions were present these could be divided with the cautery under vision through the thoracoscope. This instrument was introduced through an intercostal space under local anaesthesia, and the interpleural space examined. The appearance of the bands was quite characteristic. [Mr. Tudor Edwards showed some coloured drawings of different portions of the pleural cavity, which were made from actual cases in the Brompton Hospital, and for the reproduction of which he acknowledged his indebtedness to his friend and colleague Dr. Bennett.] The actual operation was performed by the introduction of a narrow electric cautery through another convenient interspace, and the band divided under vision. It would be found that the number of bands present was considerably in excess of those actually shown by *x* rays, but those others that were seen did not offer much difficulty in division, as they were finer and

more film-like. He wished to make it clear that thoracoscopy was not attended by any appreciable pain, nor was it followed by any evil after-effects, except perhaps slight surgical emphysema in the region of entrance. The actual cauterization was very rarely felt by the patient, but any touching of the parietal pleura was definitely painful. The cauterization should be done with the cautery red hot, not at white heat, as the latter was apt to cause subsequent haemorrhage. One of the main objects of thoracoscopy was, therefore, the examination and adhesion of the band-like adhesions, preventing collapse of a cavity after the production of artificial pneumothorax; it was also of great value as a means of diagnosis, especially with regard to pleural and mediastinal conditions. He considered that cauterization was contraindicated where tuberculosis of the pleura was present, even in the early stages, and was impossible where large surface adhesions were present. These were especially found at the apex. It would be seen, therefore, that there was only a limited field of usefulness with respect to cauterization, but even the limited number of cases would justify the retention of this method of treatment. Thoracoscopy would also be found of increasing value as a means of diagnosis in selected cases of pulmonary, pleural, and mediastinal conditions of an obscure nature.

The second surgical method of treatment which he discussed was the production of collapse of the lung by means of operations on the chest wall. Attempts at partial collapse did not appear to be entirely satisfactory. He had no personal experience of apical displacement, but the filling of the space created between the parietal pleura and the endothoracic fascia had offered some difficulty. Paraffin wax appeared to act as a foreign body, and might require subsequent removal, whereas fatty tissue for purposes of filling was only obtained with difficulty. Introduction of gauze and subsequent healing by granulation could only result in the eventual adhesion of the separated layers and the re-establishment of the pre-operative relations; for this reason the latter method did not appear to him to hold out any hope of permanent benefit. With regard to thoracoplasty, the indications were practically confined to those cases where artificial pneumothorax had been tried without success or with only partial success. There was only one exception, and that was where artificial pneumothorax had been successfully carried out with considerable improvement over a long period, the disease was considered cured, and the lung had been allowed to expand. In such cases, if symptoms recur, resumption of artificial pneumothorax would be found impossible owing to generalized adhesions over the whole surfaces of the pleura, and further gas displacement was impossible. He had performed thoracoplasty in six cases up to the present—three for tuberculosis, two for bronchiectasis, and one for pulmonary abscess. In the first three, one patient had definite extension to the opposite side, was confined to bed and was generally debilitated, with persistent vomiting and pyrexia. Artificial pneumothorax had previously been done with benefit, and further artificial pneumothorax was impossible owing to the thickness of the pleura. Improvement was marked, with disappearance of bacilli and amelioration of all symptoms. This was maintained for some months, but he had heard recently that the condition was now less satisfactory. The second case was a young man with marked symptoms of advanced disease and in a state of extreme debility. The blood pressure for several days before and during the operation was only 90 mm. systolic, and the temperature was high and inverse in type. The actual operation was withstood quite well, and for the first two days the temperature and pulse were almost normal. Collapse occurred suddenly on the third day from heart failure, and was followed by death in two hours. The third case had only recently had the first stage completed. The outlook was definitely more favourable, attempts at artificial pneumothorax were not successful, and the patient had been confined to bed owing to high fever on movement. The blood pressure in this case was measured before operation, and was found to be 121 mm., and the pulse rate 140. At the completion the pressure was 119 mm. and the pulse rate unchanged. With regard to bronchiectasis, in one case only lower half thoracoplasty was done several months before, with decided benefit up to the present. The other, in which complete decompression was performed with a seven weeks' interval between the stages, had not shown more than temporary improvement, but there was involvement of the opposite lower lobe. The point he wished to bring out very strongly was that unless the operation was performed at a reasonably early period of the disease it could not be hoped in this country to get from these measures the results which were being obtained on the Continent and in America. The operations, when done under local anaesthesia and in two stages, were accompanied only by a minimum of shock. There was one exception, and that applied more especially to cases of bronchiectasis. Shock arose from the change of position of the mediastinum, in the absence of pleural adhesions, and was shown chiefly by cyanosis and some dyspnoea. It was well illustrated by the two cases of bronchiectasis described. The one, where adhesions were present, showed no disturbance following the rib resection, whereas the other, with a free pleura, became cyanosed and dyspnoeic at the same stage, a condition which persisted in a modified degree for the ensuing forty-eight hours, but was eventually followed by the better result. All the cases had been done in two stages posteriorly, the lower ribs (5 to 11) in the first, and the upper four, including the first rib, after an interval of not more than three weeks. Local anaesthesia was invariably used. Phrenicotomy has been performed five times, either by direct division of the nerve, by crushing, or by direct intraneural injection of alcohol. He considered this measure to be of comparatively little value alone, and rarely required when the major operation was performed. He hoped that in the course of time these procedures would become more generally adopted in this country, as they were abroad. There was no doubt that they had passed beyond the experimental stage, and in the state of our knowledge to-day they offered a distinct advance in the treatment of certain forms of pulmonary tuberculosis.

Dr. CLIVE RIVIERE (London) said that they had become so accustomed to look to Vejlefjord Sanatorium for sound and progressive work in tuberculosis, that Dr. Gravesen's opening address seemed bound to strike, as it had, the right note. One or two comments he was tempted to make, although his views were mostly in agreement with those Dr. Gravesen had expressed. First, in regard to the partial pneumothorax and cauterization of adhesions, in view of his experience he found it hard to believe that the partial pneumothorax need give such unsatisfactory results as those shown in Saugman's well known statistics, and he wondered whether others could be found to agree with him in this. The great trouble with such partial pneumothoraxes was the recurrence of large reactions after refills, and if these could not be eliminated by shortening the interval and other methods, then certainly the pneumothorax was doing more harm than good. But in cases where this difficulty was overcome he had obtained much help from pneumothoraxes far from complete. They were often the means of turning disease to more chronic lines, and where a pleurisy also supervened they might initiate a healing fibrosis in an otherwise hopeless lung. He had sometimes wondered whether, in some of these cases unsuitable for more than this, the causation of pleural effusion by injection of 30 per cent. dextrose, as was used by Lucius Spengler under other conditions, might not be a sound measure. In regard to cauterization of adhesions, it seemed to him that there were extremely few cases where this measure was really indicated. When he saw Jacobaeus's radiograms he was struck with the belief that these cases were all under a low intrapleural pressure, and that many of the adhesions would have stretched, without danger or harm, under a reasonable increase—perhaps to +10+15 cm. or so. On inquiry, it proved that this was so—that the pressures used had been low ones. The few cases he recollected in the past, where separation of a single or few strong adhesions would have seemed of great benefit, had often possessed diaphragmatic adhesions, and Jacobaeus appeared to have had little success in that type of case. There was, as Dr. Gravesen remarked, a

certain indication for cauterization; but it was a narrow one. Where adhesions were multiple the pleura might be opened in order to separate them, but he thought this was inadvisable, and where the lung was closely adherent intrapleural separation was, he was sure, quite wrong. Under these conditions pneumolysis might be done, but the difficulty of the packing material became a serious consideration. He was much interested in Dr. Gravesen's trial of packing the gauze and allowing the space to granulate up, as that was quite new to him.

With regard to thoracoplasty, Dr. Riviere thought that there was no doubt that this was the operation *par excellence* in well selected cases of one-sided disease with adhesions preventing pneumothorax. The operations he had had done were performed under gas and oxygen, and no undesirable results appeared to follow the use of that anaesthetic. It was interesting to hear from Dr. Gravesen that he was now supplementing his local anaesthesia with ether given at a late stage of the operation. Looking through the records of thoracoplasty as done by French surgeons, mostly at Dumarest's instigation, he was struck by the fact that most of the cases needed a general anaesthetic before the end of the operation was reached. Surely if this was now admitted by so experienced an institution as the Vejlefjord Sanatorium, it would be better, and on the whole safer, if a general anaesthetic was given at the beginning and carried right through. It would be interesting to have Dr. Gravesen's views as to the dangers or disadvantages of this, and also whether he had used gas and oxygen, now much favoured in this country, as the safest anaesthetic to give in this class of case. They were all greatly indebted to Dr. Gravesen for having filled the place at the Annual Meeting of that great colleague of his whose presence would be missed by many all the world over.

DISCUSSION ON THE SOCIAL ASPECTS OF TUBERCULOSIS,

WITH SPECIAL REFERENCE TO ITS INFECTIVITY.

OPENING PAPER

BY

JANE WALKER, M.D.,

East Anglian Sanatorium, Nayland, Colchester.

WHEN the Section of Tuberculosis did me the honour of asking me to open the discusssion on this subject, I accepted their invitation with full knowledge of the difficulty of my task, and of the certainty that I laid myself open to severe, if not destructive, criticism. It is impossible to overestimate the importance of the subject. Tuberculosis is rightly regarded as one of the great killing diseases, being responsible for 10 per cent. of all deaths. It is the penalty we pay for our civilization, such as it is—in a perfect civilization it should be absent. It is a many-sided disease, being concerned with so many factors of life, and there is still a great deal to learn about it. A young doctor the other day who was casting about for an object for research discarded tuberculosis because all the work to be done on it had been done! It is, perhaps, thus that some of us may have spoken many years ago, but it is increasingly clear that the more we know of the disease the more there is to know about it.

The number of people who die annually from tuberculosis—and the number in this country is about 50,000, or the equivalent of a county borough—are not, of course, the only sufferers from the disease. We shall not be far out if we reckon that for every death there are about five people ill with it. And they are ill for months or years. The length of time a patient lives after the first onset of symptoms has been variously estimated from twenty-one years to thirty-one months; but lately some more exact work has been done on this subject by Dr. Wurtzen of Denmark. His material included all the deaths from pulmonary tuberculosis at the Tuberculosis Department of the Oresund Hospital from April, 1906, to the end of 1919.[1] There were 1,032 men and 780 women, as well as 87 children. The mean duration of life for adults of both sexes was 35.9—for men 37.1, for women 34.4—and only 11.9 months for children below the age of 15. He also made some investigations as to what degree sanatorium treatment influenced the prolongation of life, and he found the mean duration of life was 56.1 months, as compared with 35.9 of both sanatorium and non-sanatorium cases. Of course this comparison loses a good deal of value because of the selection of cases considered suitable for sanatorium treatment.

The mortality rate of tuberculosis has certainly been falling, so far as this country is concerned. But it has been steadily going down for the past 150 years, and we therefore cannot fairly put it down to all the extra work done and the attention paid to this most important of all diseases. This fall in mortality rate is mainly due to those causes which have helped to lessen the general mortality rate, such as the improved standard of living, housing, cleaner clothes, better food, and so forth. Incidentally, the invention of shoddy and other cheaper materials for clothes cannot have been without its effect in this direction. Dresses, for example, are no longer handed down from one generation to another, as they certainly were in the eighteenth and early nineteenth centuries. It is a great temptation, to which it is only too easy to succumb, to regard the special measures taken to deal with tuberculosis as the one chief cause of the reduction of tuberculosis mortality, and indeed, on the first glance, ordinary figures seem to offer an encouragement to this belief. But if, as someone has said, there is as much difference between domestic cleanliness and surgical cleanliness as there is between respectability and holiness, there is at least as much difference between ordinarily compiled figures and those of a careful, competent statistician. And on this last basis we have little reason, in England at any rate, to comfort ourselves. The real facts are, as shown by Ransome, that the mortality rate has been going down steadily since 1743, and Karl Pearson says:[2]

> "We have to stretch our ideas of time a little, and we should realize the possibility of a typical epidemic curve in the frequency of phthisis. Indeed, the mortality from phthisis in England has been declining since 1838—that is, long before any special measures had been taken for the control of the disease, or segregation of the sources of infection—tuberculous human beings and animals—had been attempted."

Moreover, the fall in the death rate is not constant. It is really going up in countries like Germany and Russia, and in some primitive communities. It also rose quite definitely in women during the war, mainly, probably, as the result of their entry into factories in large numbers, the restriction of food being counted as a contributory factor as well. In the present state of our knowledge, which we are only too well aware is far from complete, we are justified in going on with all reforms that tend to improve public health in general—better housing, cleaner and more abundant food—and indeed with everything that helps to improve the health of each individual in the community. We have no doubt paid too much attention to the seed of the disease, as it were, without paying enough to the soil in which it is to grow. The dictum that no big eater ever caught consumption is really substantially true, and it certainly points to the desirability of seeing that the people's food is abundant enough, of the right kind, and as cheap as possible.

There is no doubt that for infection to take place association must be close and prolonged, and the recipient must be from one cause or another in a debilitated state of health so as to enable him or her to offer less resistance to the inroads of the disease. A recent case will probably be in the minds of most of us—Collins *v.* Hopkins, taken before Mr. Justice McCardie. In this case the plaintiff Collins took a house on October 26th, 1922, and left it the next day on the ground that it was infected with tubercle bacilli, and therefore not reasonably fit for habitation. The patient left the house six weeks before, on September 11th, and the danger, if any, must have been negligible, but the plaintiff's counsel made much of the house being dusty and dirty, though that is a fact very difficult of proof. Moreover, the medical attendant had neglected to notify the case to the medical officer of health. In giving judgement, a great deal was said by the learned judge which

might well be questioned, to say the least of it, and which will tend to rouse rather than allay the groundless fears, not only of the general public, but of the less instructed members of our own profession. But he did say:

"If the patient were properly trained as to his habits and carried out the medical instructions, and if full regard were paid to ventilation, sunlight, cleanliness, removal of dirt and dust, and the like, then risk of infection might not be serious even to those who resided with him. Still less was the risk to those who entered the house after the patient had left if proper methods of disinfection had been adopted."

It is to be regretted that there is no recognized standard, either legal or medical, of what constitutes proper disinfection. I should like to say here that it is within the power of a tuberculous person in all except the very latest stages of the disease to keep himself from being a danger to the community.

The question of how a given case has contracted tubercle is very difficult to answer. In a report of 572 cases treated in 1913 and 1914, published by me in 1915, in only three could the actual source of the disease be given with any degree of certainty. In one case a girl caught it from a friend with whom she was living, and to whom she was devoted; in another, a man—a valet—caught it from his master; and in a third, a girl—a lady's maid—caught it from nursing her mistress. In all these cases the exposure was both intimate and prolonged, and the soil—the other great factor—most receptive. There can be no doubt that this latter element—the soil on which the seed falls—is really the more important of the two, though it is extremely illusive and difficult to tackle. We can only speak of it in vague terms, such as predisposition, "run-downness" in health, anxiety, selective attraction, and so forth; but still it is there, and it is a very potent factor in the contraction of the disease.

But if tuberculosis is as widespread as we have reason to think it is, how is it spread? There are two great theories at present holding the field:

1. The dose to be effective must be a massive one—that is, it must be a really knockdown dose—and, I personally should add, it must be intimate and prolonged.
2. The attack depends on the virulence of the bacillus.

But in considering these two theories we must not forget the great second factor in the case—the soil—the predisposition to which we have just referred.

Now these two theories are really unsettled, although as far as one can judge the evidence in favour of the former theory is very much the greater. A patient of mine—a clergyman—about twenty-two years ago, spent a very hot August in London, visiting every day an East-end woman suffering from advanced consumption. Open-air treatment in that district and at that time was conspicuous by its absence. He was run down, wanting his holiday, and he contracted tuberculosis of the lungs. His dose must have been a very big one, because the incubation period of the disease was so short, and he came into my hands the following February. He had an excellent constitution, had always had good health and been very well fed, but he had a most tremendous struggle for life. He was in bed for eighteen months with a high temperature, and with such heavy night-sweats that often the mattress was wet through and the wires below it rusted. But he ultimately recovered, and for the last fifteen years has had a parish in a big town in South Africa.

The second theory has been more recently brought forward, and the work on it is by no means concluded. Indeed, with regard to work on tuberculosis in general, in spite of all that has been done and the public attention that has been directed to the subject, there are many things, as I have stated above, which are still left undecided. It may be that as long as the disease exists this will always be so, and that to the very end opinions will be divided as to the causes even of its final disappearance. Indeed, this possibly can hardly be wondered at, considering the universality of the proposition. Ever since the discovery of the tubercle bacillus by Koch in 1882 there has been before us the possibility of a general immunization of the human organism; in the same way in which one attack of scarlet fever makes the subject immune to another attack, so it has been thought that to give a small dose of the disease might have the effect of stopping a large dose later on from resulting in a definite attack of tuberculosis. There is a very great deal of evidence for this theory. Some people have gone so far as to say that in early childhood immunity is conferred by the taking of milk with a small number of tubercle bacilli in it, and have wondered whether the milk campaign at this stage may not do more harm than good. I hardly like to refer to this in an assembly of this kind, but if it be true that the bovine bacillus protects from the human bacillus later on in life—and again there is a good deal of evidence in support of this—it ought at least to be mentioned. Personally I think we ought to go on getting our milk better and better, and that a clean milk campaign is a very good one and ought to be encouraged in every way in our power.

With regard, however, to the possibility of contracting tuberculosis to the extent of its being a serious illness from milk, we must remember the dictum on the special dose and on the exposure being intimate and prolonged. Moreover, in cases suspected as being from milk, the infection has often come from the milkers and other people dealing with the cows rather than from the cow. Whatever seems uncertain—and I must confess a great deal is still unsettled—the fact that tuberculosis can be conveyed from person to person is undoubted. How this is done, and by what channels it is admitted, whether it is inhaled or taken in by the mouth, is still hotly contested.

The really cheering thing is that tuberculosis is going down. Why is it going down? Here again opinions differ; some say one thing, and some another, according to the way the problem is presented to them. The sanitary reformer thinks it is drains; others think it is housing; others, again, think it is work by health activities of various sorts—welfare centres, etc.—whereby people are better educated. Others, again, think it is the formation of sanatoriums and the whole scheme for brevity called the "dispensary scheme," or the "Edinburgh scheme" because it was originated there by Sir Robert Philip. It is possible that all these different agencies have helped—improved sanitation probably; housing certainly, although there are several points that are emerging which seem to show that overcrowding even is not quite so responsible for cases of tuberculosis as we thought it was. For example, whether people live in one room or in six, as far as Glasgow is concerned, does not appear to make much difference in the incidence of tuberculosis. Again, as we have seen, tuberculosis in women went up very considerably during the war; women were employed in munition works and other factories—in other words, they largely became an industrial population on a par with men. Tuberculosis is without doubt largely an industrial disease, as is evident when we realize that the recorded mortality in men from 45 to 75 from this disease is twice as high as among women. There is also, as we have already stated, one more point as to the rise of mortality from tuberculosis in women during the war—they may have had less good and suitable food, for the mortality amongst children went up too. With regard to sanatoriums and dispensaries, this whole method has been most unfairly criticized and decried. In the first place, what this whole campaign did was to focus public attention on the immensity of the whole problem. Possibly this was done not wisely but too well, especially as regards the infectivity of tuberculosis. The general public certainly seems to have gone from the one extreme, of regarding it as no more infectious than a wooden leg, to looking upon it like measles and scarlet fever. Still, sanatoriums have done a great amount of good in treating tuberculosis and in curing a very large number of people who would otherwise have been lost to the community. And we must never forget that tuberculosis is a disease of the young whose work is still to be done, and not of the old whose best days are presumably over. It is also a disease that has attacked men and women of great

brilliancy—people who are ornaments to any state or condition of life, and their lives have been saved for many years by sanatoriums. Also, in those places where second and third stage cases are not refused, the assistance afforded to their relations and friends has been incalculable. Not only is the spread of the disease in their own homes checked, but by removing the patient they are saved the great fatigue and anxiety of nursing, and have also more money for themselves to spend on food.

In sanatoriums, also, patients learn a great deal—not by often repeated lectures, or indeed in a mass at all, but by small talks and advice given individually, as well as the more general sensible outlook maintained. In adults, too, as with children, the finishing-up habit at meals, and the porridge habit, both of which are very strongly urged at most sanatoriums, are of incalculable value. As well, too, is the knowledge that the ordinary and therefore inexpensive foods are the ones that do most good. The pride always inherent in the person who has a small appetite receives a very wholesome check in any sanatorium. If this applies to adults, it applies doubly to children. If, as really seems certain, tuberculosis is contracted in childhood, though it may not make any definite appearance till adult life, it is of the utmost importance to so increase the resistance to the disease in early life as to give it little chance when the strain comes later on in life. Where a child shows signs of having contracted tuberculosis, he should have a sufficiently long period of really efficient treatment to give him a real chance of acquiring a lasting immunity. There is some good reason for believing that this is done in some cases, though no definite conclusions have so far been obtained. The dictum "once tuberculous always tuberculous" is very hard to fight, and for a person to have to give the history of having been in a sanatorium in early life when applying for life insurance, for example, is often very detrimental to him. Many obvious sufferers from tuberculosis are much better lives, as far as insurance is concerned, than are many non-tuberculous, because they have learned real wisdom in managing their lives, and this enables them to live longer.

We have seen that tuberculosis is on the decrease—that is, that there are really fewer cases than there were; not, I am inclined to think, that the case mortality is lessened. We still get the virulent type of case that seems capable of little or no amelioration, and which runs as rapidly fatal a course as formerly; but there are certainly fewer cases of all kinds, and this diminution in numbers is specially noticeable in children. It is probable that this decrease is due to many factors the relative importance of which we are really unable to judge. There is a steadily upward trend in the habits of the people in general; their habits are better, their manners are improved. There is, for example, far less spitting than there was, and there is far more cleanliness. I recently had twenty non-tuberculous children sent down to the sanatorium from a district in the East End of London where formerly the standard of living was lower than in any other area in the metropolis. All these children had had a warm bath the night before they came, and only one was flea-marked and that very sparsely, and no child had a verminous head. For these improvements we have to thank the school medical and nursing services. Then people live better; they certainly drink less. Alcoholic intemperance, and indeed intemperance of any kind, is a most potent factor in the contracting of tuberculosis, and it greatly diminishes the power of recovery of the intemperate. Publicans, as is well known, have a high mortality rate from tubercle. They also probably get massive doses in the way of infection as well as a diminished resistance consequent on their habits.

People have also better quality in food, and the cooking is improved. They have less arduous work, and more leisure in which to improve their minds. Incidentally the Workers' Educational Association and kindred bodies have been of untold value to the nation by helping people to use their leisure time aright. Then, too, the various coal strikes have perforce made people use smoke-consuming devices more and more for their cooking and warming, and so they are breathing a far cleaner air than formerly. Again, labour-saving devices have helped to lessen the drudgery of life to a really large extent. All these things have their contributory effect on the prevention of tuberculosis.

With regard to the treatment of tuberculosis, we must see to it that the civilian part of the population has as good opportunities for treatment as has the ex-service man. We must make satisfactory provision for the wife and family while a man is away undergoing treatment, so that he may go at an earlier stage of his disease, and thus not only lessen the period of his treatment but also increase the probability of his complete recovery.

The one great thing that we must try to do for children as well as grown-up patients is to have a really effective after-care machinery, so that when the institution is left behind a friendly hand is held out to help and encourage the one-time patient when he takes up the battle of life again. The sanatorium should be linked up with the dispensary, which in its turn should be in touch with employers of labour as well as with organizations with funds at the disposal of the tuberculous person to help to supplement his earnings till such time as he is self-supporting. The question of what trade or employment he is fitted for is a very difficult one. Sometimes a sheltered trade, where the work can be arranged at such a speed as is within his powers, can be found. These arrangements, however, can usually only be met with in a colony and not in the open market. There are up and down the country colonies of various types and kinds that are attempting to deal with this side of the question, in some cases, as at Papworth and at Nayland (the sanatorium with which I am concerned), with a good deal of success.

What is known as the Framingham Demonstration was initiated in December, 1916. In Framingham, which is a town in Massachusetts of some 16,000 inhabitants, machinery has been organized for a twofold purpose:

> "(1) To serve the general health needs of the community; and (2) to bring under observation all of the tuberculosis in the community, to apply the best known methods of treatment, to develop a comprehensive programme of prevention, and to organize most effectively the varied resources of the community for tuberculosis control, disease prevention and health creation."

A periodical examination of a large proportion of the inhabitants of the town, a census of all individuals in the town, covering matters of hygiene, housing, economic status, etc., a survey of tuberculous infection among cattle supplying milk to Framingham, are amongst the various activities that have been undertaken. Mr. Charles Hatfield is the secretary, and he gladly gives all the information in his power. The last report I have seen is dated February, 1921, and covers the first four years of working. It is a very interesting experiment, and on paper at any rate seems worthy of being applied to this country. Perhaps such an organization as the People's League of Health might be so constituted as to give most valuable help, if not actually to undertake this work.

In conclusion, there is no royal road to success with the tuberculosis problem any more than there is in any other subject of such great magnitude, and if the lines of advance outlined above seem rather humdrum and dull, I am convinced that it will be along such lines that future success will travel.

REFERENCES.

[1] *Tubercle*, October, 1922, p. 22. [2] *The Fight against Tuberculosis and the Death Rate from Phthisis*, London, 1911, p. 9.

DISCUSSION.

Dr. H. BATTY SHAW (London) said that before he committed himself to any statements on the social aspects of the infectivity of tuberculosis he must endeavour to clear the ground on which he proposed to stand, and if the process of clearance sounded self-opinionated and wanting in elaboration, he asked his audience to remember that there was much to be said, and little time in which to say it. Tuberculosis was spread by tuberculous milk and by the emanations from human beings who were infected with the disease; therefore, if we could but stop these sources of

infection the disease would stop. The infant's food composed of cow's milk could be sterilized, and if any important elements such as vitamins were destroped in the process they could be supplied from other non-tuberculous sources of food. However difficult it was to supply infants with sterilized milk, we must do it, or fail to prevent infant mortality from bovine sources of infection.

Turning to the problem of preventing a person infected with tuberculosis from spreading it to his or her neighbours, we must be prepared to shelve some beliefs, and one in particular would have to go—namely, that a tuberculous subject discharging tubercle bacilli infected adult neighbours with tuberculosis of the lungs. It was easy to make the sacrifice, because no candidate for a post as honorary physician or surgeon to a hospital dealing with tuberculosis ever allowed such fear to enter his head, and if it did it was disregarded. Further, there was no arrangement for the special pensioning of any sister or nurse who, having accepted duty in such an institution, revealed the disease; and, lastly, insurance offices did not reject the application or load the life of any such applicant for life insurance on the ground that the occupation was so dangerous.

When was the human being infected with human tuberculosis? Again, asking for forbearance and excusing himself from giving reasons and authorities, he said at once that he agreed that human tuberculosis is initiated in childhood, and the source of the infection was a near neighbour who was discharging tubercle bacilli. It was necessary, therefore, in order to prevent human tuberculous infection, to segregate the neighbour who was discharging tubercle bacilli or to remove all children from the neighbourhood of those who were discharging tubercle bacilli. Such advice must not be ignored, and if it was ignored it was promoting, not defeating, the spread of tuberculosis. If it was said that such a scheme was quite impracticable, the answer was that it was not so impracticable as the effort which many were now making, in obedience to a false doctrine, in treating at great expense the person who was discharging no tubercle bacilli without being sure that he was suffering from tuberculosis, and at the same time asking the person who was discharging tubercle bacilli to go to an infirmary, which he or she would not do, or to remain in his own home, which he was perfectly willing to do, although it was known that this would lead to the infection of neighbouring children. Further, it was hardly necessary to remind the audience that the vision of yesterday, over and over again, had become the policy of to-morrow. If all efforts were bent in the direction of sterilizing milk which was infected with tubercle bacilli, and in the direction of removing the person who was discharging tubercle bacilli from the neighbourhood of children, which was possible, not from other adults, which was impossible, tuberculosis, bovine or human, would be stamped out. All measures which were not based on these two conceptions were valueless—indeed, wasteful.

The person who was the subject of pure pulmonary tuberculosis was not dangerous to his or her neighbours for the simple reason that he or she did not discharge tubercle bacilli. Pure tuberculosis of the lung could never be diagnosed with certainty, for the reason that tubercle bacilli were not expectorated. Such cases were of no more danger to other children (for it was in children that pure pulmonary tuberculosis occurred) than would be a child who had a tuberculous joint, or tuberculous gland, which was not discharging. The person who could, and did, infect children with human tuberculosis was the man or woman who was suffering from impure pulmonary tuberculosis—that was to say, pulmonary tuberculosis which was something else as well.

It was an unpalatable remark to make, but none the less true, that we had in the past been working on the wrong idea—namely, that because Koch showed that tubercle bacilli could be recovered from the expectoration and also from the lungs of those who were expectorating tubercle bacilli, all the changes in the lungs concerned were caused by the tubercle bacillus. No one doubted that all lesions found in the lungs which were the seat of miliary tuberculosis, or confluent tuberculous pneumonia, were due solely to the tubercle bacillus. But no one who had studied cases of lung disease, in which, besides miliary tuberculosis, pneumonia and excavations were found, could admit that it had ever been proved that the pneumonia and the excavations were tuberculous in origin. The convention they were living under was that there was a unity in the causation of all the lesions met with in the lung of a person who had expectorated tubercle bacilli during life; but if they would read through medical literature of the days when Koch made his brilliant discoveries, they would see that there was another school of thought which would not subscribe to such a doctrine. At long last these forgotten papers were coming into their own, and they would notice in the most recent authoritative works on tuberculosis of the lungs that the writers were beginning to admit that the old convention under which we had all lived and worked must go, and that the truth must be admitted that the accompanying pneumonia and excavations were due to mixed infection. It was being recognized at last that, however much we believed on clinical grounds that the tubercle bacillus could cause exudative pneumonia with cavity formation, experimental evidence gave a flat denial. The tubercle bacillus was not pyogenic; the pus present in the expectoration, although revealing tubercle bacilli, was not due to that organism, but to one or more organisms which were pyogenic. It was impossible experimentally to produce pneumonic with excavational tuberculous disease in the lungs of any animal by inoculation with the tubercle bacillus alone. The Royal College of Physicians of London had expunged from its last volume of the nomenclature of diseases, published in 1918 by a joint subcommittee on which there sat the Registrar-General of Deaths or his representative, the words "consumption" and "phthisis," and their place was taken by the term "pulmonary tuberculosis." Dr. Batty Shaw submitted that these terms should be reintroduced to describe those conditions of impure pulmonary tuberculosis already referred to, and he suggested that there was a non-tuberculous consumption, or a non-tuberculous phthisis, because there were cases of excavation and consolidation of the lungs which neither at the bedside nor in the deadhouse could be shown to be due to tuberculosis. He thought that the cases of tuberculous consumption or tuberculous phthisis were *qua* the tuberculosis extremely dangerous to the community, most certainly to childhood, and possibly (though he could not convince himself that it was true) to adults, for the reason that they were the cases who expectorated tubercle bacilli.

What was it that converted a relatively rare and harmless (to the neighbouring child) pure pulmonary tuberculosis into a very common and dangerous (to the neighbouring child) tuberculous consumption or tuberculous phthisis? The answer was the mobilization usually in adults of the tubercle bacilli contained in more or less harmless foci of tuberculosis contracted in childhood, by the baneful tissue-destructive effects of the pyogenic organisms of influenza, pneumonia, bronchitis, etc. These latter diseases attacked youths and early adult people, who on leaving the parental roof were exposed to the pyogenic respiratory epidemic and endemic infections of schools, city offices, factories, and social gatherings. We must segregate those who contracted such non-tuberculous respiratory infections; or we must rely upon preventive inoculation against non-tuberculous respiratory infection. What we did not long ago in the visitation of a severe influenzal epidemic we must do in the equally dangerous (so far as the genesis of tuberculous consumption or tuberculous phthisis was concerned) endemic non-tuberculous respiratory infections. If they said that this was impracticable and visionary, he again reminded them that if this vision was but based upon truth it must become the future policy. If they held up their hands at the expense entailed in the logical management of cases of tuberculous consumption and tuberculous phthisis, accepting the belief in the duality or multiplicity of the nature of these diseases, he pointed (1) to the present unsatisfactory results obtained at great expense, (2) to the hardships inflicted on those who were said to be suffering from early tuberculosis, and (3) to the spread of tuberculosis by those who were expectorating tubercle bacilli at the present moment. Was it not high time to abandon a doctrine which was false and follow out plans which were based upon established though may be unpalatable and

unfashionable truths? They had only recently—as Dr. Jane Walker had reminded them—been shown how confused medical opinion had become by reading the conflicting evidence given by their colleagues in the law courts. He was sure that a great part of the confusion was due to the fact that some of them still held by the old convention of the unity of tuberculous consumption and tuberculous phthisis and turned a deaf ear to those who would maintain that the process was a dual or multiple one. Could it be wondered at that the public, seeing their confusion, doubted their convictions and ridiculed Acts of Parliament based upon them? The spread of tuberculosis would be countered by feeding children, when it was necessary, with cow's milk which had been sterilized, by the segregation, maybe permanent, of those who discharged tubercle bacilli, and by the temporary segregation of those who were suffering from non-tuberculous respiratory infections. It was possible that the infection of the young with a certain amount of tuberculosis, bovine or human, might be beneficial; but he suggested that, until they knew what amount of infection was beneficial and what amount was harmful, they should try rather to prevent all infection with any form of tubercle bacillus.

Dr. J. E. CHAPMAN (London) said that in the latter part of her interesting paper Dr. Walker called attention to the need for developing really effective after-care machinery in connexion with the schemes for combating tuberculosis. It was to this matter that Dr. Chapman wished to direct attention. Tuberculosis in its more chronic forms was a disease which extended over long periods; periods of ill health tended to alternate with periods of fair health and even in the most favourable cases the duration of treatment was considerable. The wage-earning capacity of the patient was consequently extinguished from time to time and in many cases there was a permanent reduction of earning capacity. The effect of these conditions upon the family was quickly felt, unless some savings had been laid by for a rainy day, if the patient happened to be the breadwinner or the mother of the family, and the whole family tended to drift into a state of poverty. The Chief Medical Officer of the Ministry of Health said in his Annual Report for 1921:

"Poverty is an important factor in the causation of tuberculosis, and tuberculosis in turn is itself a cause of poverty. The vicious circle thus formed can be broken by action on sociological lines as well as by appropriate medical treatment. 'Early treatment' of the sociological problems arising from the occurrence of a case of tuberculosis in a family is frequently as important in the interests of the patient and the family as the medical treatment of the individual sufferer."

The occurrence of tuberculosis in a working-class family, particularly if the patient was an adult, was frequently an economic disaster. What results could they expect from the best medical treatment if the patient and family were drifting into a state of poverty and the patient was probably unable in consequence to follow out adequately the treatment prescribed? Could they expect patients, who had responded well to treatment in a sanatorium, to retain their improved health if they had to return to unsatisfactory home conditions resulting in part from straitened circumstances? Were the underfed children of the family likely to resist possible infection satisfactorily? Care committees, by attending to the economic problem in the cases of individual sufferers and their families, could frequently assist very materially in rendering treatment effective, in reducing the risk of relapse, and in minimizing the danger of spread of infection. The Departmental Committee on Tuberculosis—the Astor Committee—recognized the need for care committees and stated in its Interim Report published in 1912:

"The effectiveness of the work of the dispensary can be greatly increased by the organization of voluntary care committees formed of representatives from the local authorities, boards of guardians, insurance committees and from all charitable and social work organizations in the district. In this way all available agencies can be linked up and any extra assistance such as additional food, change of air, clothing, better home conditions, more suitable occupation, etc., that may be needed to enable patients to benefit to the fullest extent from the treatment provided may readily be secured."

The Local Government Board drew the attention of counties and county boroughs to the above statement in a circular issued in 1915, and added:

"It appears to the Board to be important that Committees such as the Departmental Committee recommended should be organized in every area for which a scheme for the treatment of tuberculosis has been adopted, and, inasmuch as the work of these committees should relate to the whole community, their organization should be undertaken under the general direction of the councils of counties and county boroughs, who are responsible for the schemes of treatment."

Unfortunately a variety of circumstances—the war, the inherent difficulty of the work, and the scarcity of trained social welfare workers—had led to the development of these committees being slow. In some areas, however, excellent care committees had been established, and he thought that he could indicate the nature of their work most satisfactorily by quoting examples of cases which had been dealt with by them. Before he referred to these cases, however, he thought it might be useful to set out one or two important principles which should govern the action of care committees. In the first place the aim of the committee should be to help the patient to help himself rather than to allow him to be dependent on others. The care committee should not be a kind of public assistance committee doling out financial help, but a body which would consider in detail the needs of each patient and his family and determine how best they could help him to regain or maintain economic independence. It would, however, sometimes be necessary for the committee to give material assistance, but such assistance should only be given with the greatest circumspection and as a preliminary to the execution of a carefully arranged plan by which the patient might be expected ultimately to be able to depend upon his own resources. When material assistance was needed, it was desirable, in order to prevent overlapping of effort, for the committee to bring the patient into touch with the appropriate national or local agency which could meet the need. In this way the British Red Cross Society, the United Services Fund, Charity Organization Societies, Invalid Children's Aid Societies, Juvenile Employment Committees, and many other organizations, whose spheres of activity would be known to the committee, could render invaluable aid. In order to secure complete efficiency it was, however, usually desirable, particularly in the provinces, where the network of social welfare organizations was not so extensive as in London, for the committee to possess some funds to enable them to help cases which could be dealt with by existing organizations. Much excellent work could, however, be done by a committee which possessed no funds for this purpose, as will be seen from the cases he proposed to quote. In the second place, the unit with which the committee should deal should be the family and not the individual member who was suffering from tuberculosis. Any action which improved the circumstances of the family would have its proper effect upon the patient and vice versa. In the third place, action should be taken when necessary before the circumstances of the family had become disorganized, on the principle that prevention was better than cure. The Ministry of Health dealt with these last two points in a recent circular issued to Metropolitan Borough Councils as follows:

"The occurrence of tuberculosis in a single member of a family may have a serious effect upon the social and economic circumstances of the family as a whole, and it is consequently essential that the unit with which the care committee should deal should be the family and not the individual patient. The early consideration of the economic effect of the occurrence of tuberculosis in a household is as important as the early diagnosis of the disease in the individual. The primary duty, therefore, of the committee should be to consider the economic position of the family of every patient suffering from tuberculosis as soon as he comes within the purview of the dispensary scheme, and to render such advice and assistance as circumstances of the case dictate, with a view to enabling the family to adjust their circumstances to the new conditions, to maintain their economic independence and to derive the fullest possible advantage from the medical treatment prescribed."

He then quoted a number of actual cases, taken from the records of a number of Care Committees, to illustrate these principles in action:

Case 1.—The patient lived with a widowed mother, sister and three brothers, with whom he shared a bed. The Care Com-

mittee obtained a grant of £5 from the R.A.F. Benevolent Fund, and bed, bedding and blankets were provided so that the patient could sleep alone.

Case 2.—The father, mother and five children slept in one room, the patient, a child, sharing a bed with others. Within a fortnight the landlady was persuaded to give up one of her rooms for the benefit of this family.

Case 3.—The patient, an ex-service man, lived in unsatisfactory lodgings, his wife and children living elsewhere also in lodgings. A house was secured from the local authority and the Red Cross assisted with removal expenses.

Case 4.—A case of illegal increase of rent was satisfactorily settled through the intervention of a Care Committee.

Case 5.—Inquiry showed that the patient was eligible for the return of income tax. A substantial sum was recovered through the aid of the Committee.

Case 6.—This girl was in need of clothes and the family were badly off. The Committee collected two complete sets of underclothes, boots and stockings.

Case 7.—This ex-service man needed clothes to enable him to go to a sanatorium. The Red Cross was approached and supplied the necessary outfit.

Case 8.—The patient, a boy, lived in an unsatisfactory home. The mother being dead, a sister of 19 managed the home, but owing to inexperience the income was badly laid out. The girl was advised by a competent and sympathetic worker, and the results have been distinctly beneficial.

Case 9.—Action on the part of a Committee in a country district secured a grant from an educational charity to enable a delicate contact to pay bus fares to and from school daily.

Case 10.—The mother in this family required sanatorium treatment but could not leave her family of three children including a baby. The baby was sent to a residential nursery; the other children, being delicate, were sent to a convalescent home at first and were subsequently boarded out. The father paid 17s. a week until he fell out of work and the Red Cross found the balance. Needless to say this case involved the Committee in a good deal of work, but resulted in the mother being able to enter a sanatorium.

Case 11.—The patient was formerly a carman. The Committee secured a grant from the patient's former regiment to pay for a course of instruction in motor driving. The patient then secured employment.

Case 12.—This case showed that the action of an energetic Committee might even extend beyond the life of the patient in the interests of the family. The family consisted of a widow, two daughters, and a son. After the death of the daughter the Committee arranged for the emigration of the family, the son to Adelaide, through the Scottish Corporation to a Government farm, and the mother and daughter through the Salvation Army to Victoria, where domestic work will be found for them. It is hoped that the family will ultimately be reunited and make a home together.

It was difficult to see how any of these cases could have been dealt with adequately without help from a care organization, and he agreed very heartily with Dr. Walker's view that really effective social welfare machinery was essential in dealing with the tuberculosis problem.

Dr. G. BROOKES DIXON (Birmingham) said that there could exist no reasonable doubt as to the infectivity of tuberculosis since Koch's discovery. Unfortunately the factors were so variable, so complex, so difficult to appreciate in their entirety that we were prone to accept in abstract whilst to some extent ignoring them in practice. The extent of infection was shown by the tuberculin test; in Paris, Vienna, and Prague the test was positive in 55 per cent. of children aged 5 years. The possibility of infection was shown by the examination of clinical records. In Birmingham, of 7,347 children there were 2,664 who possessed fathers, brothers, mothers, or sisters who were known to have died from or to be suffering from tuberculosis. The fathers or brothers amounted to just over 10 per cent.; the mothers or sisters were about equal, and represented by a figure just over 8 per cent.; husbands and wives affected in about 1 per cent. of cases. The amount of fatal disease resulting from infection could be more or less accurately measured by the mortality rates, which in European countries varied for tuberculosis between 7 and 19 per cent. of the total mortality rate. Fortunately between the numbers who are known to have suffered infection and those who died from tuberculosis there was a large discrepancy, represented by those who suffered more or less damage from their infection and its resulting disease. One of the main difficulties to-day was that we had no stabilized or complete knowledge as to what were the factors which determined whether an infection would have a benign and protective action or whether it would lead to serious illness and ultimate death. In regard to the most vulnerable period for infection, there was an accumulation of evidence which suggested, and much considered opinion which asserted, that this existed within the first half-decade of life. The question was asked, How did infection from human sources occur? Infection with human tuberculosis was acquired from (1) sputum and its spray, (2) intestinal excreta (Calmette), (3) the urine of tuberculous patients (Burnard), (4) from the milk of nursing mothers (as shown by Delépine in England, Schroeder and Cotton in the United States, and Yamada in Japan); it was also asserted that (5) it might be conveyed by living carriers, a part, it was suggested, which might be undertaken by flies. How then, he asked, could infection be guarded against? In this connexion attention should be directed to both human and bovine sources of infection. Infection from human sources might be controlled (1) by the adoption of measures designed to protect individuals who were exposed during the period when they were most susceptible—that was, during infancy and early childhood; and (2) by activities directed to the supervision and control of known sources of infection. The protection of infants and young children, as exemplified by the Grancher system in Paris, had given excellent results. It was based on the assumption that tuberculosis was not acquired by heredity, but by contact, especially during infancy. It was asserted that most infants of mothers suffering from open tuberculosis who remained in their care became infected, whether breast-fed or not; the danger was said to be the same if the father or another member of the family had open tuberculosis. Armand-Delille quoted the history of 150 tuberculous families, and showed that when the children remained at home with infected relatives the tuberculosis morbidity rate was 60 per cent., and the tuberculosis mortality rate 40 per cent. Amongst 2,300 cases removed from infection by the Grancher method the morbidity rate was 0.3 per cent. and the mortality rate 0.01 per cent., showing a striking difference between similar rates for children not removed from the source of infection. The Grancher method might be difficult to inaugurate in England; parents there were unwilling to give up control of their children. This, however, was no valid excuse for leaving children exposed to infection. Pritchard advocated tuberculin injections for infants under these conditions. It was simple, practical, economical, and so far free from complications and accidents. Measures for the control and supervision of known sources of infection might take the form of (1) education of patients and their contacts; (2) arranging for some segregation in the home by the supply of beds and bedding—there were now over 700 in use in Birmingham, and 200 sleeping shelters; (3) by providing a larger number of beds in institutions for the accommodation of advanced and chronic cases. Comment as to the education of the patient was unnecessary. Institutional accommodation should be provided (1) for treatment, (2) for education, and (3) for alleviation; in addition it exercised a measure of protection over the family by reducing the physical strain, removing the centre of infection, and relieving the economic pressure. More beds usually meant a longer period of stay, and segregation was practised unobtrusively. Possibly there was more than a casual relationship between the number of beds provided for tuberculous patients and the death rate, as was suggested by the figures for New York City:

Year.	Beds.	Deaths from Pulmonary Tuberculosis per 100,000.
1907	3,300	209
1914	8,151	173
1921	6,414	89

Compulsory segregation was not advisable, but the possession of compulsory powers was useful. Because they were not enforced was no argument as to their futility. There was no intention to enforce them frequently, but rather to educate public opinion and reinforce the argument in getting patients to accept a prolonged period of treatment in their own and others' interests. The best defence against bovine infection was the treatment of milk in such a way before sale as to render any tubercle bacilli present inert.

Dr. C. MUTHU (Mendip Hills Sanatorium) agreed with Miss Walker that our knowledge of tuberculosis was still in the making, and that many problems connected with it remained yet unsolved. One reason for our lack of knowledge and uncertainty with regard to tuberculosis might be that we had been putting the cart before the horse and had concentrated our attention on the microbe rather than on man, who was, after all, the chief actor in the drama. There was no doubt that the study of social conditions of a people, their daily life and their habits, their food and drink, their occupation, their housing accommodation—these human factors helped to give a truer insight into the nature of tuberculosis and its prevention than any other study. Tuberculosis was, to a great extent, a social, economic, and industrial disease. While it could not easily thrive in the fresh air, in the open country, where there was good nutrition and the best hygienic surroundings, it throve in slums and overcrowding, in underfed children, in poverty and destitution, which were the outcome of the present social system. The economic history of tuberculosis and its rate of mortality during the last sixty or seventy years brought out the lesson that periods of war, depression of trade, industrial and economic stress, were followed by unemployment, a lower standard of living, poverty, and an increased mortality rate from tuberculosis; whilst times of peace, revival of trade, industrial prosperity, continuous employment, cheapening of food and sanitary reforms, contributed to the happiness and well-being of the people and to a diminished death rate from phthisis. Even the sharp rise in tuberculosis mortality during 1914 to 1918 showed the close relation between social and economic conditions and the death rate of phthisis. Social environment, then, played an important part in the incidence of tuberculosis. Bad social, economic, and hygienic environment could be roughly grouped under three heads: insufficiency of fresh air and light; insufficiency of housing accommodation, leading to overcrowding; insufficiency of food or ill balanced food, leading to malnutrition. Facts observed from all parts of the world showed a positive correlation between density and the death rate from tuberculosis. In London, when the proportion of overcrowding was under 7.5 per cent., the death rate of phthisis was 1.044; but when it was 27.5 per cent. or more the death rate rose to 2.052. While in poor and crowded Finsbury the death rate for phthisis was 2.14, in spacious and well-to-do Hampstead it was only 0.63. In Glasgow, among families living in one room the phthisis death rate was 23.3, among those occupying two rooms it was 18.9, three rooms 14.3, and in four rooms it was reduced to 12.7. So in Dundee: in houses of one room the death rate from pulmonary tuberculosis was 74.4 per 10,000, in two rooms 64, in three 55.2, in four rooms and upwards 32 per 10,000. It was seen, therefore, that the smaller the accommodation the greater was the mortality, and the larger the accommodation the smaller was the mortality from tuberculosis. In India he had found the same thing. Crowded Bombay presented a higher death rate from tuberculosis than Bangalore with its garden cities. Among Mohammedan women, who were secluded in ill ventilated zenanas, the death rate was nearly three times as high as among men. In fact, the more strictly the purdah system was observed the greater was the mortality, as among Mohammedan women; and where it was not enforced, as among the Burmese women, it was even lower than among men. In England the death rate for phthisis was higher among males than females, because they were employed in industrial occupations which involved bad hygienic surroundings. But if, as during the late war, the females were subject to the same influence of occupation, the mortality rate was the same or rose higher than males. Also, as Dr. E. L. Collis had observed, if an industrial environment was replaced by an agricultural environment, as in Ireland, which meant working in fresh-air conditions, there was no difference in the incidence of tuberculosis between males and females. So that whether in India or England, whether among males or females, whether in sedentary or industrial occupation, the death rate of tuberculosis was influenced by the extent of overcrowding and vitiated atmosphere where people lived and worked and where their bodies were deprived of the vivifying influence of fresh air and sunlight. On the other hand, in Edinburgh, where certain insanitary areas were replaced by new buildings which admitted plenty of fresh air and light, the death rate for phthisis fell from 45 to 15 per 1,000; while in Liverpool, in the new healthy areas with practically the same population, it fell from 4 to 1.9 per 1,000. But overcrowding was only one of a group of social evils which clustered round tuberculosis. It was closely associated with and was a symptom of poverty. The greater the poverty the greater was the tendency for the poor to crowd themselves into two- or one-room tenements. Dr. Menzies truly said the other day that the most important factor in connexion with tuberculosis was the food question. In India one of the three great determining factors in the incidence of tuberculosis was the hopeless state of poverty of millions of people (the other two factors were overcrowding and insanitation), which so undermined their stamina that they fell victims literally in thousands to any epidemic or disease that came along their way. Dr. Muthu had elsewhere recorded that India lost a million people annually from the scourge of tuberculosis alone. Coming nearer home, it was found that Germany, Austria, and other mid-European countries furnished evidence on a large scale of a great increase in tuberculosis mortality from chronic starvation and malnutrition. The German physicians were so impressed with the effects of underfeeding that Professor Kayserling, one of the foremost authorities in Germany, confessed that tuberculosis should be regarded primarily not as an infectious disease, but as a disease of nutrition, to be controlled much more by feeding than by preventing infection. The dictum to which Dr. Walker had alluded—that no big eater ever caught consumption—seemed to be true to a very large extent. B. S. Warren of America found, in common with many other workers, that low wages went hand in hand with high tuberculosis mortality, for low wages meant poor food, poor housing, and deficient nutrition. All these deficiencies, whether they were of fresh air or light, of housing accommodation or of nutrition, or restful surroundings, tended to lower vitality and to reduce the resisting powers, and brought about a faulty metabolism, which in turn prepared a soil favourable to infection. He had always considered that soil was more important than seed in the incidence of tuberculosis, and that infection was rather an effect of a poor soil, whether it were in man or beast. Dr. Walker had made a reference to the milk question. In India, where Dr. Muthu had recently travelled some hundreds of miles visiting many important cities on a tuberculosis mission, he found that tuberculosis among cattle was very scarce, that children were mostly breast-fed, that many Indians drank little or no cow's milk, and when they did they invariably had it boiled before use, and yet tuberculosis was very prevalent in many parts of India, and was increasing. It was only by knowing facts like these and comparing notes with other countries that we could enlarge or modify our knowledge concerning the disease. Tuberculosis was, therefore, intimately associated with social and economic evils which pressed upon a large mass of population and which opened up large issues, such as fair wages, unemployment, poverty, slums, overcrowding, etc. Sir Douglas Powell had said that the prevention of consumption involved a much wider issue than the circumvention of the bacillus. No doubt open-air sanatoriums had done much good work in this country in bringing about an arrest of the disease in a large number of cases, and in educating the patients and their friends in the right way of living. For the prevention of tuberculosis the State should go further and make an earnest attempt to initiate social reforms to improve the general health of the people. For it was not so much by destroying infection as by attacking boldly the social evils of the present day, by raising the standard of living, by improving the well-being of the people, and thus increasing their resisting powers, that we could hope to eradicate tuberculosis in the near future.

Dr. S. VERE PEARSON (Mundesley Sanatorium) said that notification was largely ineffective in that it was incompletely carried out, especially in point of time, and was not put to

good use. It should mean more frequent examination of contacts and of home conditions. It should lead to demography, marking the black spots where tuberculosis was most rife in houses and in industries. It should lead to a proper disinfection, and for this the most important measures were soap and water, fresh air and sunshine. Further, the affected person must be taught to be hygienic in regard, for example, to sputum disposal. The reasons why notification was not as effective as it might be were twofold: the majority of doctors were still ill trained in the subject of tuberculosis, and the grossly exaggerated fear of infection was still very rife. Two broad facts wanted placing in juxtaposition and pondering over—namely, that over 80 per cent. of individuals over 15 years of age had the infection of tuberculosis in their bodies, yet only 1 in 12 died of tuberculosis.

Dr. CLAUDE LILLINGSTON (Gorleston-on-Sea) pointed out, with regard to the notification of tuberculosis, that so long as his patients were more bullied than blessed by notification he felt tempted to label his cases as "heart disease." He suggested that the enormous rise of heart disease in New York since 1910 reflected the tendency on the part of practitioners to shield their patients from the disabilities of notification.

Dr. R. ROBERTSON (Ventnor, Isle of Wight) said that the question which seemed complex had resolved itself in the course of the discussion to the need of an unlimited purse under the control of the medical profession.

Dr. R. A. YOUNG (London) added his tribute to the admirable opening address of Dr. Jane Walker. He emphasized the importance of the social aspects of the disease referred to by her—namely, infectivity, home conditions, family care, after-care, and occupation. He gave it as his opinion that the social measures suggested would seem to limit and perhaps control the spread of the disease, but he thought the last word would be with the bacteriologist. The gaps in our knowledge were largely in the biology of the tubercle bacillus and in the immunity responses of the human body to it.

TREATMENT OF TUBERCULOSIS BY THE SPAHLINGER METHOD.

BY

LEONARD WILLIAMS, M.D.,

LONDON.

In the cases whose details are given below I had the advantage of being associated with Drs. Dudley Kennard, Ernest Griffin, N. S. Bonard, and A. F. Bouchage. As the cases speak for themselves I refrain from comment. Many of these patients have often been collected, and could be collected again, for purposes of demonstration. Cases 17 to 23 have been treated with partial serums only, which were prepared in 1919-20. Two of my other patients were subsequently handed over to my friend the late Dr. Latham in 1914, amongst whose cases their records will be found. They are both well and at work to-day. I might have added details of three other advanced cases which have been completely cured, but as they appear elsewhere it is unnecessary to do so. It seems desirable once more to emphasize the fact that Spahlinger's treatment is of two kinds—namely, (*a*) serums for acute and severe cases, (*b*) vaccines for early or chronic pulmonary cases, and for all surgical cases. The serum acts rapidly. The symptoms of activity show progressive diminution and often disappear within the first few months. If the serum is stopped before a complete recovery has been established, signs of activity are liable to recur. This is because serums are capable of conferring a passive immunity only. It is the vaccines which evoke the active; these act less rapidly than the serums. Improvement under vaccine treatment does not become evident until the organism has had time fully to mobilize its defensive mechanism.

CASE 1.

F. B., aged 35, seamstress. History of haemoptysis eighteen months ago. Tubercle bacilli present. Had been treated at sanatoriums. When first seen, in July, 1913, she suffered from cough, expectoration (tubercle bacilli present 30 to 40 per field), haemoptysis, dyspnoea, and anorexia; temperature 101°, pulse 120. Signs of infiltration of both upper lobes. Spahlinger's treatment by serum was commenced in July, 1913. In January, 1914, the chest was dry, and temperature and pulse normal. Treatment stopped. She had a short course of vaccine in April, 1914. In May, 1914, there was no evidence of active disease and no tubercle bacilli. Discharged.

CASE 2.

D. W., aged 25; pale youth with typical malar flush. History of succession of bad colds. Severe attack of haemoptysis which lasted ten days. Troublesome cough, breathlessness. When first seen, in August, 1913, he had cough, expectoration (tubercle bacilli present 10 to 20 per field), haemoptysis, temperature 100°, pulse 100; had lost 1 st. 6 lb.; there was much dyspnoea, pain in right side, clubbing. Signs of infiltration of left upper lobe and upper half of lower lobe. Spahlinger's vaccine treatment was commenced in August, 1913. In April, 1914, there was no evidence of active disease; temperature, pulse, and weight were normal. Discharged.

CASE 3.

F. E., thin, anaemic man, aged 35. History of cough, emaciation, lassitude, shortness of breath. When first seen, in October, 1913, he had cough, a little sputum in the morning (no tubercle bacilli present), dyspnoea, night sweats; he was very emaciated; temperature 100° to 102°, pulse 100 to 110. Signs of scattered infiltration in left lung and at right apex. Spahlinger's treatment by serum commenced in October, 1913. In March, 1914, there was no cough and no sputum; temperature, pulse, and weight were normal. In October, 1914, there was no evidence of active disease. Discharged.

CASE 4.

W. C., anaemic boy, aged 15. History of tuberculous laryngitis diagnosed six months previously. When first seen, in January, 1914, he had cough, expectoration (tubercle bacilli present), night sweats, pain in chest, loss of voice, sore throat. Signs of infiltration at both apices, more marked on the right side. Tuberculous ulcerations of vocal cords. Spahlinger's treatment commenced in January, 1914. In May, 1914, the larynx was much improved and chest practically dry. Treatment stopped prematurely.

CASE 5.

A. W. A case of tuberculous epididymitis who received a short course of Spahlinger's treatment in 1914. His records have been lost. He was examined in 1920 for another complaint and there was then no evidence of active tuberculosis.

CASE 6.

A. T., aged 19, seamstress; comes from tuberculous stock (two brothers and two sisters died of pulmonary tuberculosis). History of cough and expectoration for one year. When first seen in December, 1914, she had cough, expectoration (tubercle bacilli present 60 per field), emaciation, slight pyrexia, clubbing. Signs of infiltration at both apices, chiefly left. Spahlinger's vaccine treatment was commenced in December, 1914. After a six months' course of injections, during which the patient was able to continue her work, there was no evidence of active disease. Discharged. In 1923 there is no trace of active tuberculosis. The patient has had no treatment since June, 1915, and is doing a full day's work.

CASE 7.

E. G., woman, aged 29. First seen in November, 1913, on her return from a sanatorium where she had been for nine months. Complained of glands in the right side of neck, for which an operation had been strongly urged; a large mass pushing the trachea well over to the right. She was given a course of Spahlinger's vaccine. To the first five injections there was no reaction. To the sixth she reached to 102°, to the seventh to 104°. Immediately thereafter the glands began to diminish and in three weeks had disappeared. The disappearance of the glands was accompanied by a striking general improvement. She has remained perfectly well ever since.

CASE 8.

H. D., aged 48, tradesman. Previous history: three years ago he had acute digestive troubles, an attack of haemoptysis, pyrexia, and cough. Improved after residence in country. In 1913 he became worse; tubercle bacilli found in sputum. Tuberculin injections were followed by violent reactions. When first seen, in December, 1914, he had cough, expectoration (tubercle bacilli present 5 to 10 per field), pyrexia, haemoptysis, emaciation 11 lb., night sweats, palpitations, pain in chest, clubbing. Patient complained of laryngeal troubles; voice hoarse. Signs of infiltration of right upper lobe with softening at apex. Spahlinger's vaccine treatment was commenced in December, 1914. In May, 1916, there was no evidence of active disease. Discharged. Died of influenza in 1918.

CASE 9.

H. D., woman, aged 41, teacher; comes from tuberculous stock. History of pneumonia in 1900. Pulmonary tuberculosis diagnosed in 1901. Went to sanatorium—no marked improvement. Sent to another Swiss sanatorium for four years, whence she returned slightly improved but still coughing and expectorating a good deal. Subsequently she had tuberculin injections. Sent to the Taunus Mountains, where she became slowly worse in spite of constant

care and all-day rest cures. When seen, in November, 1914, she had cough, abundant expectoration frequently blood-stained (tubercle bacilli present), slight pyrexia, palpitation, anaemia, emaciation 1 st. 7 lb., much dyspnoea, pain in chest, vomiting. There were signs of extensive infiltration of both lungs with cavitation at the right upper lobe. Spahlinger's vaccine treatment was commenced in November, 1914. In June, 1915, the cough and expectoration had diminished by two-thirds, the dyspnoea was less troublesome, weight unchanged, indigestion and anorexia stopped, activity in chest greatly diminished. In October, 1915, the patient was still showing general improvement when she suddenly died of amyloid disease. Vaccine treatment seemed to improve the pulmonary condition very materially, but it could do nothing for the degenerative process resulting from fifteen years of disease.

CASE 10.

A. B., clerk; a pale youth, aged 21. Comes from tuberculous stock; grandmother and brother died of pulmonary tuberculosis; sister, aged 13, and brother, aged 27, died of generalized tuberculosis. The patient contracted bronchitis in 1908; ever since he has been weak and never able to get rid of his cough. During the summer of 1911 he had a second bad attack of bronchitis, and a third one during the summer of 1912. He was treated with rest, creosote, and tonics. In the autumn of 1914 a gland appeared on the right side of the neck, and in December it had greatly enlarged. When first seen in December, 1914, he had cough, expectoration (tubercle bacilli present), night sweats, great lassitude, anorexia, clubbing; he had lost 1 st. 4 lb. during the last six months. There were signs of scattered disease in both lungs. A gland was punctured, and tubercle bacilli found in pus. This glandular strain showed an unusual virulence in the laboratory tests. Spahlinger's treatment was started in December, 1914. Serum was injected into the gland and a few vaccine injections given subcutaneously. On May 31st, 1915, the night sweats, lassitude, indigestion, insomnia, and anorexia were entirely gone. There were no active signs in the chest. The patient had gained considerable weight. Believing himself cured, he discontinued the treatment. In August, 1915, a little swelling appeared on the right side of the neck. Vaccine treatment was resumed on August 14th, 1915, and continued until February 6th, 1916, when there were no active signs in chest, no cough, and no sputum, the weight was above normal, and the glands had disappeared. Discharged. In 1923 there was no relapse whatever since treatment was stopped seven years ago. The patient has been able to work uninterruptedly from the beginning of 1916 down to the present day. There is no trace of active disease. The frequent attacks of bronchitis and indigestion, which used to be very troublesome previous to Spahlinger's treatment, have entirely disappeared. He had influenza once in 1919, but it only lasted three days. He is now apparently quite well.

CASE 11.

J. D., a thin youth, aged 21; shop assistant. History of bronchitis and pleurisy in March, 1913. Cough and sputum ever since. Sanatorium treatment. Discharged improved. When first seen, in December, 1914, he had a cough, expectoration (tubercle bacilli present 20 to 30 per field), emaciation, sweating, tachycardia, dyspnoea, melaena, clubbing. Signs of infiltration extending throughout left lung with massive disease at base and scattered infiltration in right lung. Spahlinger's serum treatment started in December, 1914. On April 3rd, 1915, the patient was much improved. During 1915-16 he had several courses of partial serum. In 1917 there was no evidence of active disease, weight normal, general condition very satisfactory, still some dyspnoea; discharged. In June, 1921, there was evidence of recrudescence of symptoms; tubercle bacilli in sputum, emaciation 12 lb., signs of activity in left lung. Partial serum treatment resumed. At present there is no evidence of active disease. The patient has a little sputum in the morning, but all the examinations for bacilli made in 1923 have been negative. Physical signs dry; weight above normal; still some dyspnoea. He has been able to work uninterruptedly since 1916, even in 1921 during the period of recrudescence of symptoms.

CASE 12.

M. P., a thin, anaemic woman, aged 23; shopkeeper. History of succession of colds, cough, etc., for two years. Pain at right apex behind. When first seen, in March, 1915, she had cough, expectoration (tubercle bacilli present); emaciation 13 lb. in last few months. Signs of infiltration at both apices. Spahlinger's vaccine treatment was commenced in March, 1915. In November, 1915, physical signs dry. In July, 1916, there was no evidence of active tuberculosis; no cough and no sputum for several months. Discharged. In 1923 the patient is very well; she has been engaged in normal work since 1916.

CASE 13.

G. P., aged 26, mechanic. Sister suffering from abdominal tuberculosis. Pleurisy in 1900 and again in 1911. History of pulmonary tuberculosis. When first seen, in May, 1915, he had cough, abundant expectoration frequently blood stained (tubercle bacilli present), pyrexia, loss of weight 1 st. 10 lb., haemoptysis, night sweats, dyspnoea, palpitations, weakness, clubbing. Signs of infiltration of the whole of left lung, with large cavity at apex, and signs of softening in upper lobe, also infiltration of right lower lobe. Spahlinger's treatment was commenced in May, 1915. In August the patient was able to resume his work, which he had given up four years previously. In November, 1915, condition improved, afebrile, expectoration diminished by 80 per cent.; still a few moist sounds in the left lung, and tubercle bacilli scanty; increase in weight 1 st., treatment stopped. Resumed in June, 1916, and continued until October, 1916, when the patient left for France much improved.

CASE 14.

B. B., an extremely debilitated man, aged 35; shopkeeper. History of pulmonary tuberculosis. When first seen, in May, 1915, he had cough, expectoration (abundant purulent tubercle bacilli present, 30 to 40 per field), pyrexia, tachycardia, emaciation 13 lb., profuse night sweats. Signs show infiltration with softening in both upper lobes. Spahlinger's serum treatment was commenced in May, 1915. In May, 1916, there was great improvement; sputum scanty, signs in chest practically dry, weight normal; the patient resumed work; discharged. In 1918 he had a bad attack of influenza. In 1919 a second attack of influenza. Died.

CASE 15.

J. L., aged 44; insurance agent. Pulmonary tuberculosis diagnosed in 1896. Sent to Switzerland in 1906. Tubercle bacilli constantly present in sputum. When first seen, in October, 1915, he had cough, profuse expectoration, occasionally blood stained, loss of weight. In spite of various treatments during the last twenty years no real improvement took place, and tubercle bacilli have always remained present. The patient was able to do light office work. Signs of scattered bilateral infiltration. Spahlinger's vaccine treatment was commenced on October 13th, 1915, and continued during a period of eight months, while the patient was attending his business. Having completed his course of vaccine treatment, he was discharged on June 17th, 1916, much improved. Still a trace of sputum with tubercle bacilli present. Signs in chest practically dry. In June, 1923, clinical examination and *x* rays show scar tissue in both lungs, but no evidence of active disease. There is a little cough and phlegm in the morning, but from 1917 down to the present time the sputa show no tubercle bacilli. The patient had a severe attack of influenza in 1920 but no bacilli could be found. He is now in excellent health, and has been engaged in active work for the last six years, although he has had no treatment since 1916.

It is interesting to note that some vaccine cases, such as the above, after having completed a course of vaccines, were discharged while tubercle bacilli were still present in their sputa. These bacilli subsequently disappeared without any further course of treatment, showing that the vaccines had thoroughly roused the patient's resisting power. It is well to remember that the conversion of diseased areas into cicatricial tissue takes time.

CASE 16.

H. B., a thin, anaemic man, aged 30; nurse. Comes from tuberculous stock. History of frequent colds, bronchitis, cough, etc., during previous year. When first seen, in June, 1916, he had cough, expectoration (tubercle bacilli present), slight pyrexia, dyspnoea on exertion, tachycardia, emaciation 5 lb., pain in chest on right side. Complains of chronic laryngitis (non-tuberculous), no appetite, lassitude. On the nose there was a tuberculous lesion which had resisted all previous treatments. Signs of infiltration at left apex and hilus. Spahlinger's vaccine treatment was started in June, 1916. In November, 1916, the symptoms were apparently quiescent, and the general condition much improved; the tuberculous lesion on the nose was cured. Discharged. The patient remained at work during the whole period of treatment. In September, 1922, there was no evidence of disease, no cough, no sputum, weight normal. Since discharge (end of 1916) the patient has worked as masseur in a Turkish bath (twelve hours daily), and notwithstanding the strenuous work has had no relapse. At present the patient is living abroad and is unavailable for examination; he writes that he is well and working.

CASE 17.

H. M., man, aged 34. History of chronic pulmonary tuberculosis treated in sanatoriums, sea voyage, etc. Improvement after tuberculin injections. Served during the war and had several attacks of haemoptysis. When first seen, in May, 1921, cough was very troublesome, expectoration purulent, profuse (tubercle bacilli present, 100 per field), temperature 102°, pulse 100 to 120, haemoptysis, loss of weight 1 st. 10 lb., sweating, much dyspnoea, intercostal pain, clubbing. Signs of extensive infiltration in both lungs, mainly on the right side, with signs of softening at both apices; large cavity in right upper lobe, cavity at left apex and at apex of left lower lobe. Spahlinger's partial serum treatment was commenced in May, 1921, when the patient's condition was very critical. Serum was given subcutaneously and by mouth. In July, 1921, the condition was much improved, but a large area in the right lower lobe was still very active. In August, 1921, activity had apparently stopped, the temperature was normal, cough and expectoration diminished by two-thirds; the patient was able to get about. In November, 1921, there was an increase in weight of 1 st. 4 lb. In February, 1922, the patient stopped treatment and went abroad much improved, in spite of an attack of influenza. In 1923 the patient is leading a normal life.

CASE 18.

W. K., a pale youth, aged 19; sailor. History of pneumonia in October, 1920; haemorrhages. Tuberculosis diagnosed in February, 1921, when the sputum showed tubercle bacilli to be present. When first seen, in May, 1921, he had cough, expectoration abundant, purulent, often blood stained (tubercle bacilli present 2 to 3 per field), frequent haemoptysis, emaciation 11 lb., night sweats, dyspnoea, diarrhoea, anorexia; temperature 102.2°, pulse 100 to 110. Signs of extensive infiltration of right lung and scattered foci in left. Involvement of larynx. Spahlinger's partial serum treatment was commenced in May, 1921. In January, 1922, the chest was dry and he was able to resume work. In May, 1922, there was no

evidence of active disease, no sputum, still a little cough, temperature and pulse normal, gain in weight 3 st. 3 lb., lesions in throat cured. Discharged. In 1923 the patient is quite well and engaged in unusually strenuous work.

CASES 19 AND 20.

Two severe cases of pulmonary tuberculosis whose records are unavailable. One improved with partial serum treatment, the other died after a few injections, his case being probably too far advanced to respond to the very partial treatment available.

CASE 21.

R. K., aged 45; engineer. Comes from tuberculous stock. History of pleurisy and malaria in 1917 in East Africa. Second attack of pleurisy in 1918, followed by two bad attacks of influenza. Severe bronchitis in October, 1919, never cured. At the end of 1919 a cavity was located at the right apex and tubercle bacilli found in sputum. Came to Europe in August, 1921. When first seen, in September, 1921, he had cough, abundant purulent blood-stained expectoration (tubercle bacilli present 40 to 60 per field), emaciation, haemoptysis, severe sweating, much dyspnoea. Signs of extensive infiltration of right lung, with large cavity in upper lobe, and scattered infiltration in left lung. Spahlinger's treatment was commenced in October, 1921. At the end of December, 1921, the patient had improved—expectoration had diminished by two-thirds, temperature and pulse normal, night sweats stopped. He developed malaria early in 1922. He remained in bed during January and nearly all February with severe attacks of malaria; parasites traced in blood. Acute heart troubles. Partial serum treatment intensified. Lost 6 lb. In March the patient improved rapidly. In July physical signs were practically dry; tubercle bacilli still present, but scanty, weight and strength normal, dyspnoea on exertion; the patient felt very well and was able to lead a normal life until February, 1923, when a renewed attack of malaria occurred. In March partial serum treatment had to be resumed on account of reactivity of pulmonary lesions. At the beginning of April the signs in the chest had dried up considerably and sputum decreased, but the patient was still suffering from malaria. On April 14th, 1923, the patient died of heart failure. He had been so weakened by tropical residence and tropical disease that his power of resistance gave out.

CASE 22.

D. B., a well-nourished man, aged 26; clerk. In January, 1920, he had a profuse haemoptysis; tubercle bacilli found in sputum. When first seen, in October, 1921, he had cough, expectoration purulent, often blood stained (tubercle bacilli present 10 to 20 per field), haemoptysis, emaciation, night sweats, dyspnoea on exertion. Signs of infiltration of left lung and softening at left apex, also infiltration at right hilus. Spahlinger's partial serum treatment was commenced in October, 1921. Several attacks of haemoptysis until June, 1922, when the patient was much improved. In July he had pneumonia, followed by profuse haemorrhages and exacerbation of all physical signs; partial serum treatment intensified. In August his condition had much improved; temperature and pulse normal. In April, 1923, the patient was feeling very well and had been leading a normal life since January. There was still a little sputum in which few tubercle bacilli were occasionally present. Physical signs practically dry; probability of cavitation at base of left upper lobe. General condition very satisfactory.

CASE 23.

L. H., a man aged 46; engineer. Comes from tuberculous stock. History of pleurisy. Tubercle bacilli found in sputum in 1908. Repeated sanatorium and tuberculin treatment. Artificial pneumothorax in 1918. Disease never arrested. When first seen, in September, 1922, cough was very troublesome, there was abundant often blood-stained expectoration (tubercle bacilli present 20 to 30 per field), slight pyrexia, pulse 100, emaciation 2 st., intense dyspnoea, palpitations, pleurisy on right side, weakness, flatulence, anorexia, anaemia, clubbing; he complained of ulcerated throat. There were signs of bilateral infiltration and softening at both apices. Spahlinger's partial serum treatment was commenced in September, 1922. In July, 1923, his condition had much improved; there was still a little cough in the morning; expectoration diminished by two-thirds (tubercle bacilli scanty), temperature and pulse normal, increase in weight 10 lb., dyspnoea less troublesome but still present, chest practically dry.

[Cases 10, 11, 15, 17, 18, 21, 22, and 23 were accompanied by skiagrams which appear to support the statements in the text, but are not found quite suitable for publication.]

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

CANNABIS INDICA IN SMOKING TOBACCO.

I WAS summoned one evening to see a young woman who was reported to have become suddenly "paralysed." On arrival at the house the mother told me that about two hours previously her daughter had introduced into her nose some tobacco dust, after which she had become very giddy and had lost the use of her legs. It appeared that a young man spending the evening with them had induced the girl, and also her sister, by way of a rather foolish joke, to sniff up the dusty tobacco at the bottom of his pouch in the manner of snuff. The sister, aged 17, had shortly afterwards vomited violently, and no further untoward symptoms developed in her case. The patient, however, aged 18, I found in a very curious condition.

She was lying on a couch, frankly intoxicated (no alcohol had been administered), talking incoherently and giggling in a fatuous manner. She could not move her lower limbs, the feet and lower legs being completely anaesthetic, and there was general paraesthesia. The pupils were dilated and the pulse was frequent. She was oblivious to her surroundings unless well shaken, when she took some notice and would answer questions.

While some of these phenomena might possibly be attributable to nicotine, the highly emotional state, in one of a normally placid temperament, made me suspect cannabis indica. I accordingly impounded what remained in the pouch (the tobacco being of a well known and popular brand of a cheaper type) and had it analysed by Dr. Herbert Henstock, M.Sc., Ph.D., of this town, and I am much indebted to him for the trouble he took and his report. He stated that he found "0.66 per cent. of solid cannabis indica in the sample, equivalent roughly to about 1 drachm of the *B.P.* tincture per ounce of tobacco."

This is not a large proportion, perhaps, but evidently the amount taken was sufficient to cause toxic symptoms. Seven and a half minims of the tincture have been known to produce toxic effects. That the condition was not one of mere hysteria is, I think, proved by the vomiting of the sister, in whose case the nicotine effect predominated, and rapid elimination prevented further trouble. This all seems to show that tobacco, when absorbed from the nasal mucosa, has a much more profound effect on the system than when smoked in a pipe. In the latter case the nicotine is known to be largely converted into pyridine bases during combustion, and probably cannabis indica, if present, is also changed in some way.

The patient, after the administration of an emetic, strong coffee, etc., slowly came round.

Shrewsbury. R. L. E. DOWNER, M.D.Lond.

EYELID PENETRATED IN SEPARATE PLACES BY EYELASHES.

THE following case may be of interest to your readers, as by a strange coincidence the lid was penetrated in two places by separate eyelashes.

On June 30th, 1923, Miss A. B., aged 23, consulted me, complaining that a lash had been irritating her left eye for the past three weeks. Until then there had been no previous trouble, and the lashes and lids were apparently normal except for two lashes as at *F* and *Fi* in the diagrams.

On the free edge of the upper lid were seen two faintly

blue vertical streaks an eighth of an inch apart; on everting the lid, these were seen to run backwards towards the sulcus subtarsalis, where one of them terminated in the free tip of an eyelash, *F*. The second one, although it had penetrated the lid, had not perforated the conjunctiva, and was left for the time, as it was causing no irritation. As it was impossible to see the proximal end of either lash the former was removed by cilia forceps from its free end. It came away complete and with no trouble. Apparently both lashes had grown backwards from their roots, through the substance of the lid.

London, W. SYDNEY TIBBLES, L.R.C.S. and P.Edin.

PSEUDO-CYESIS.

THE following notes on a case of pseudo-cyesis, which came under my notice some time ago, appear to be sufficiently interesting to be recorded. I have altered the dates throughout, for obvious reasons.

In the middle of June, a woman, aged 46, who had had several children but had been a widow many years until she remarried late in the preceding year, consulted me about her condition as she thought she was pregnant again. I ascertained that the menstrual periods were quite regular and found no signs of pregnancy, and informed her that she was mistaken, and to convince her pointed out that there was no enlargement of her breasts and that they contained no secretion as they had no doubt done in her previous pregnancies.

She went away convinced of her mistake, as I thought, but returned in September and informed me that I must have been mistaken about her condition as she was sure she was pregnant, and that now her breasts had enlarged and contained milk. This, to my surprise, proved correct, but she was not pregnant, and she denied having stimulated the breasts in any manner. I again assured her that she was not pregnant. She returned, however, early in the following November to ask when the baby would be born. Examination then showed a copious secretion in both breasts. After further assurance she went away, and although I saw her several times afterwards the subject was not mentioned again.

D. S. PRACY, F.R.C.S.Edin.

VOLVULUS OF AN ASCENDING COLON.

MRS. ——, aged 69, who had been delicate as a girl, spending eight winters on the Riviera, and in whom shocks such as bad news usually caused vomiting, had, when I saw her, for one month experienced some abdominal discomfort, but "nothing to speak of."

Abdominal pain and vomiting commenced on April 29th, 1923, and continued during the night. When seen next day the abdomen presented a smooth elastic swelling about the size of a full-time foetal head, above and to the left of the umbilicus; it was movable, resonant, fluctuant, with no fluid thrill and no pelvic attachments. The next day she was comfortable, but after visiting her physician and dining, vomiting recommenced. She was not seen for forty-eight hours, when it was evident that an acute condition existed in the abdomen.

I made a median incision from the xiphisternum to below the umbilicus; at first sight the rounded swelling appeared to be a distended stomach, but the hand moved freely round it and the appendix presented on the top of it. It was easily delivered; the ileum was above and in front of the liver and stomach, and wound round the hepatic flexure clockwise. After unwinding and replacing the small bowel the transverse colon was demonstrated; the hepatic flexure was thoroughly freed from adhesions, the transverse colon inflated well, and the caecum and ascending colon were replaced; breathing being difficult, further operative procedure was contraindicated.

With the exception of difficult deflation she made an uninterrupted recovery.

Guildford. A. H. BRODRIBB.

WANDERING SPLEEN IMPACTED IN THE PELVIS.

THE following case appears worthy of record, as without laparotomy a true diagnosis could not possibly have been arrived at.

A Mohammedan woman, aged 28, was admitted to hospital on May 31st, complaining of a tumour in the abdomen which caused pain. She gave its duration as two years, stated that her periods had been regular during this time, but that she had had frequent attacks of malaria. The history in such cases is as a rule unreliable, since patients' ideas of time are vague, and they have an impression that the longer they state they have suffered from a disease the more attention will be paid to their case. In this case, on examination, a centrally situated, hard, irregularly nodular tumour was found rising to within an inch of the umbilicus. A provisional diagnosis of fibroids was made. On examination per vaginam, a hard tumour was found occupying the whole of the true pelvis. Attempts to pass a sound failed on two occasions, and it was thought one had to deal with a cervical myoma. The woman was kept under observation for five days, during which time she had evening rises of temperature to 100° F. or so, on alternate days, and she was given quinine.

Preparations having been made for dealing with a difficult hysterectomy I opened the abdomen on June 5th. Exposure of the upper end at once revealed the nature of the tumour, as splenic tissue was recognized. The incision was enlarged downwards, the absence of adhesions verified, and the tumour easily brought out of the abdomen. The pedicle being long its ligature and division was a simple matter. The condition of the other pelvic organs was then looked into. The uterus was found flattened out against the rectum, and had the appearance of a broad thick ribbon; hence my inability to pass a sound. The patient made an uneventful recovery and was discharged cured (*minus* her spleen) on June 21st, sixteen days after operation.

The pathological report by Lieut.-Colonel F. P. Mackie, I.M.S., states as follows:

"The tumour in the spleen was originally of a cystic nature, evidence of loculi still remaining. At some time suppuration must have taken place and probably some haemorrhage. The structure is now that of dense sclerosing connective tissue, laminated at the peritoneal edge and more open in the interior. No signs of pus are now present, nor were micro-organisms seen. There is no evidence of hydatid membrane."

A. J. VERNON BETTS, M.B.Lond.,
Civil Hospital, Nasik, India. Lieut.-Colonel I.M.S.

Reports of Societies.

REST IN THE TREATMENT OF PHTHISIS.

AT a meeting of the Brighton and Sussex Medico-Chirurgical Society, held on September 6th, with the President, Dr. ELIOT CURWEN in the chair, Dr. A. NEVILLE COX read a paper on local and general rest in the treatment of phthisis. He referred to the effects of overfatigue in industry, and its share in causing the breakdown in cases of phthisis. The betterment of industrial conditions, especially in shortening the hours of work, brought about by the Factory Acts and otherwise, must have played an important part in the reduction of phthisis mortality among women. Up to 1866 the female death rate was higher than the male, but since that time the female rate had always been lower, and was falling more rapidly. In Dr. Cox's opinion the increased mortality among women during the war was due largely to physical overstrain in the munition factories, combined with poorer feeding. Where fatigue had been the chief cause of a disease, rest must be the chief measure in its treatment. The literature of tuberculosis showed remarkable changes of opinion on the relative merits of rest and exercise in the treatment of phthisis. Even now there was one school, especially in America, which advocated rest and another which relied rather on exercise; in this country the tendency was to underrate the importance of rest. The indications for rest were the toxaemic symptoms. Dr. Cox described the methods of securing general rest for the body in the several stages of the disease, and in particular the details of "absolute rest" as laid down by Paterson. He pointed out that the phthisis patient, even when his disease was becoming quiescent, should do everything "on low gear," and should stop short of fatigue in his exertions: hence the great difficulty for ex-sanatorium patients in competing with healthy men at their old occupations. The success of pneumothorax treatment and of the conservative treatment of surgical tuberculosis had led to renewed interest in the possibility of obtaining local rest for the affected lung. The natural means by which the body endeavoured to limit function in the diseased lung were outlined; and several ways in which this process might be helped, by posture, control of breathing, and various forms of lung-splints, were described.

Reviews.

HYGIENE OF THE WAR.

Two volumes on *Hygiene of the War*,[1] forming part of the official *History of the Great War*, have been published. The first volume deals with sanitary organization, instruction in hygiene, purification and supply of water, the disposal of waste products, the housing and clothing of the soldier, and the hygiene of transports; the second with various matters relating to food, and with special diseases and disease-producing insects.

The general success of the military sanitary administration, especially in France, is well recognized, but Sir WILLIAM MACPHERSON, the editor of the series, states in his preface to these two volumes that it has been difficult to measure the saving of man power. He takes the morbidity rates for the chief water-borne diseases in the South African war as the best basis for comparison, and states that in that war 58,000 out of an average strength of 208,000 suffered from typhoid and over 8,000 died, while on the Western Front in the late war less than 7,500 were affected in an average strength of a million and a quarter, and there were only 266 deaths. Similarly, the admission rate for dysentery, which was 86 per 1,000 of strength in South Africa, was not above 6.18 in any year on the Western Front. In dealing with water supplies the editor refers also to the value of the water reconnaissances of an expert geologist in Egypt and Palestine. Among the new types of work was the wholesale disinfestation of persons and clothing, the need for which was increased by the demonstration in 1918 that the louse was the conveyor of trench fever.

It was shown that the long accepted figure of 0.3 per cent. of the strength as the daily admission to hospital was seldom exceeded when sanitary measures were effectively carried out, and it became a valuable mark above which investigation would always show some obvious defect in sanitary control.

The early efficiency of the sanitary organization was due to the fact that the pre-war scheme formed a sound foundation on which extensions and new methods could be based. It is laid down that every commander is responsible for the health of his men and the sanitation of the area which they occupy, and that he should have an expert sanitary officer as his adviser. In order to give satisfactory sanitary advice and supervision in detail divisional sanitary sections were organized, but, owing to the frequency with which divisions were moved, it was subsequently decided that more effective sanitary control could be exercised by having sanitary units for fixed areas and giving them control of laundries and baths. The rapid increase in sanitary personnel was brought about mainly through the London Sanitary Companies of the Territorial Force which acted as training centres. Overseas it was found desirable to form schools of sanitation, one being provided in each army area, where sanitary personnel were instructed in the latest methods, and instruction was also given to members of other branches of the service. Emphasis is placed on the fact that good sanitation cannot be achieved by the medical service alone, but needs the active co-operation of every commander and every individual; consequently attention was given to propaganda of a popular type.

Opportunities were afforded for laboratory work of various kinds, including the provision of mobile bacteriological laboratories to assist in the early diagnosis of infectious disease, and also of motor vans fitted as hygiene laboratories. Three beds per 1,000 troops proved sufficient as a general rule. Early notification, not only of the usually notifiable diseases, but also of scabies, trench fever, influenza, venereal disease, and other diseases in which special investigation was being carried out, was provided for.

The account given of the supply of safe drinking water constitutes a detailed and instructive dissertation on the methods by which water was obtained, purified and conveyed to the soldier in no matter what position he might be. In France the water companies had mobile apparatus for purification and motor tank carts for the conveyance of the water, and these doubtless saved the situation on a number of occasions. In Egypt the conveyance of water by large pipe lines over considerable distances, with intermediate pumping stations, alone made the campaigns possible. Water containing 200 to 300 parts of sodium chloride per 100,000 could be drunk for a week to ten days without ill effects, but 150 parts was generally regarded as the limit which should not be exceeded in drinking water. Horses readily drank water with 500 parts, and camels water with 1,000 parts per 100,000. In Mesopotamia it was necessary to use river water chiefly.

The chapter on the disposal of waste products brings out the diversity of conditions, but all methods resolved themselves into burning or burying the solid matter in the safest and most convenient way. As regards latrines, the open deep pit was naturally condemned as dangerous, but the shallow trench latrines came to be regarded as by no means satisfactory and were soon abandoned, and where possible replaced by deep latrines with fly-proof covers. For burning excreta the Horsfall destructor proved very useful, and many other similar destructors were improvised for the destruction of waste products of various kinds. Considerable difficulty was met with in the disposal of greasy and soapy water from cookhouses, ablution benches and laundries, and various types of trap were devised. In all these matters the reader is impressed by the ingenuity shown in devising methods and improvising apparatus for carrying out principles which were decided upon.

The housing and clothing of the soldier are next dealt with. In the United Kingdom the pre-war standard of 600 cubic feet with 3 feet between beds had to be reduced owing to pressure on accommodation to 400 cubic feet with 40 square feet of floor space, which meant in an ordinary army hut only 18 inches between beds; a result of this may have been the outbreak of cerebro-spinal fever among the Canadian troops in 1915. The healthiness of different kinds of lodgements is discussed. In France, at first, billets, buildings, tents, and bivouacs were mainly utilized, but subsequently hutting was used as much as possible; the Nissen hut occupied a prominent place, but many other designs, both English and French, were in common use for various purposes. Towards the end of the war the area occupied by the troops was regarded as consisting of four zones from front to rear from the point of view of the type of quarters available for personnel. These zones were: (*a*) Forward zone of dug-outs, (*b*) the secondary zone of dug-outs or shelters, (*c*) the reserve zone of billets supplemented by huts concealed as far as possible from enemy aircraft, and (*d*) the back zone of billets or hutted or tented camps. More and more attention came to be devoted to clothing. The design of boots was greatly improved as the result of a special inquiry; attention was also paid to rendering them watertight. Much wastage occurred in the first half of the war owing to chilled feet and frost-bite, due mainly to the prolonged wearing of boots in trenches where the wet conditions were combined with restriction of the circulation by puttees and the absence of exercise. Special arrangements were made for the drying of socks and other clothing. Various modifications were made in the uniform in different parts of the world as experience was gained.

The volume, which has separate chapters on the Western Front, Egypt and Palestine, North Sinai, Mesopotamia, Italy, Macedonia, and North Russia, closes with a chapter on the hygiene of transports, in which are described arrangements to increase space and improve ventilation, and also the precautions taken to prevent the introduction of infectious diseases into the United Kingdom. There are numerous useful plans and diagrams, and the chapter on schools of instruction and hygiene is particularly well provided with photographs of sections of camps with various sanitary appliances *in situ*.

Among the diseases dealt with in the second volume are malaria, cerebro-spinal fever, trench foot, scabies, bilharziasis, trachoma, small-pox, and plague. There are also special chapters on prisoners of war, on the special physical test station, and the base hygiene laboratory in France. As in the first volume, the subjects are dealt with

[1] *History of the Great War, Based on Official Documents: Medical Services. Hygiene of the War.* Vols. I and II. Edited by Major-General Sir W. G. Macpherson, K.C.M.G., C.B., LL.D., Colonel Sir W. H. Horrocks, K.C.M.G., C.B., and Major-General W. W. O. Beveridge, C.B., C.B.E., D.S.O., K.H.P. London: His Majesty's Stationery Office. 1923. (Med. 8vo, pp. 400 and 596 respectively; illustrated. 21s. each net, post free 22s.)

in great detail, and anyone interested in a particular subject will find a wealth of information. We may refer to some points of special interest: it is stated that the harmful effect of exposure is to some extent counteracted by a liberal ration and daily hot food. Men in the trenches were given daily an extra three-quarters of an ounce of sugar. It was found in Gallipoli, where cases of beriberi occurred, that yeast was the most efficient prophylactic. A table is given showing the antiscorbutic and antiberiberi value of various foods. Besides the usual analyses of water, food, and drugs, and toxicological work, the base hygiene laboratory was called upon in 1918 to make the gum fluid to be used for saline infusion; it contained 6 per cent. of gum in a 0.9 per cent. solution of sodium chloride; as much as 75 litres was made daily and sent up the line.

In Eastern Europe malaria occurred mainly, as was to be expected, along the courses of rivers and in wide valleys with swampy borders. One of the deciding factors was the temperature; the disease occurred as high as 4,000 feet, but there was none at Monastir, at an elevation of 2,000 feet. In Egypt and adjacent countries malaria did not occur on desert land, but oases and irrigated areas were associated with virulent malaria; the commonest type of malaria was benign tertian, and the next malignant malaria, either alone or in conjunction with the former. Quartan was the least common. It is remarked that mass-debility from malaria far exceeded the losses from any other disease. The measures taken to combat the disease can be classified as (1) drug prophylaxis, (2) culicifuges, (3) personal protection, (4) mosquito destruction. Quinine was extensively used as a prophylactic, but no clear opinion of its value was reached. The method of administration varied greatly, and we advise the reader, in order to obtain a wider view on this point, and more detailed information, to refer to the articles on the subject in volume I of the *Medical Diseases of the War*. Cerebro-spinal fever broke out in military camps in England early in 1915 under conditions of overcrowding, and the investigations and preventive work carried out by specially appointed officers are described in great detail.

The methods of dealing with flies and lice are discussed in separate chapters. The relation of fly prevalence to dysentery is indicated, as is also the importance of manure as a breeding ground; full particulars are given as to the method of rendering manure heaps harmless. It was always found that where burial of refuse took the place of incineration flies at once became prevalent. As regards lice, which are the means of conveyance of typhus, relapsing fever, and trench fever, the complete dependence of the louse on man's blood is emphasized. The steps taken to detect its presence and to carry out cleansing of the men and disinfestation of clothing, bedding, and billets are described. All eggs are killed by exposure to 2 per cent. lysol for five minutes at a temperature of 50° to 65° F., and to 2 per cent. lysol or cresol in twenty minutes at room temperature. The various pieces of apparatus used in disinfestation by heat are described. Sir W. HORROCKS concludes that it is probable that in the war 50 per cent. of the admissions to hospital from troops in the field armies were attributable to lack of personal cleanliness and to vermin. The importance therefore of every possible facility being provided for men to keep themselves, their clothing, bedding, and billets, free from vermin cannot be over-emphasized. As regards scabies, it was found that the best ointment was sulphur of a strength of 1 in 15, the *B.P.* strength of 1 in 10 being too irritating. An interesting chapter deals with the subject of trachoma, which occurred mainly in the native labour corps.

With regard to small-pox, the lesson taught by the war is that where compulsory vaccination is not allowed, and unprotected men are sent to a war area where small-pox is endemic, a sharp epidemic may flare up.

A VIENNESE TEXTBOOK OF FORENSIC MEDICINE.

WHEN in 1878 Hofmann published his textbook on forensic medicine the work was recognized as initiating a new era in regard to the subject. By his investigations and experimental inquiries into the changes which occur in the body after death, into violent asphyxia, especially drowning, and into the effects of various forms of violence, he showed the inaccuracy of many accepted views and placed the whole subject upon a more scientific basis.

His textbook is classical and served to attract to Vienna and to inspire a large number of pupils who have become distinguished in this branch of medicine. The book rapidly passed through eight editions under his supervision, Kolisko edited the ninth, and now we have the tenth edition, which has been completely revised and brought up to date by Professor HABERDA, his successor in the chair at Vienna and an outstanding authority on all medico-legal questions.[2] No man was more fitted for the task, from his distinction as a writer and investigator and also from his having had at his disposal for nearly thirty years the immense material of the Medico-Legal Institute at Vienna.

The new edition is considerably enlarged and has now over 200 illustrations. It contains an account of recent advances, written so as to afford medical men all that is essential and yet without overstepping the limits which must control a general textbook. Copious references to recent literature enhance the value of the work for those engaged in more advanced study, while the section of medico-legal psychiatry has been ably rewritten by Professor Wagner Jauregg.

It is no exaggeration to say that it is the best and most complete textbook on the subject in any language.

THE THERAPEUTICS OF DIGITALIS.

THE monograph on *The Therapeutic Use of Digitalis*[3] by G. CANBY ROBINSON, Professor of Medicine at the Vanderbilt University, is a reprint of the article which appeared in the first number of *Medicine*, a quarterly review of medicine, neurology, and pediatrics, published in May, 1922. Professor Robinson presents us with a critical review of the very extensive literature on the subject of digitalis, but with the ultimate object of sifting out from the results that have been obtained by observation and experiment what is of practical application and suited to the needs of practitioners of medicine. The various members of the digitalis group are considered and the different methods of determining the potency are discussed. The author favours the "cat" method of assay, and he gives a table showing the relative potency of some of the preparations of digitalis and its allies, in terms of the amount of the drug in milligrams which is the fatal dose for the cat on the basis of 1 kilogram of body weight—that is, which is equivalent to 1 cat unit. He makes a strong plea for the standardization of the drug on this basis. In the case of the tincture 1 c.cm. should represent 1 cat unit. The toxic effects of the drug on the gastro-intestinal tract or on the heart are dealt with in much detail in view of the importance of their early recognition in carrying out efficient treatment. The effects of therapeutic doses of the drug on heart muscle, on the cardio-inhibitory mechanism, on the blood vessels, and on the kidneys are then discussed and the practical application of the whole is reached in chapters which treat of the use of the drug in heart failure. This part of the book is expanded and the various disorders of cardiac mechanism, valvular disease, muscle incapacity, or nerve disturbance are treated separately.

In discussing dosage and method of administration the "Eggleston" method receives attention. As a result of experiment it has been found that 0.15 cat unit per pound of body weight is likely to give the maximum therapeutic result. As most high grade tinctures have a strength of about 1 cat unit per 1 c.cm., it is possible to calculate the amount of tincture likely to be required in any case—for example, a patient weighing 140 lb. would require about 21 c.cm., and this could be administered in a few doses, beginning with, perhaps, half the total quantity and giving the remainder in diminishing doses.

There are 163 references to the literature of the subject from American, British and other European publications. The book will be found of value to any who are interested in cardiac problems.

[2] *Hofmann's Lehrbuch der Gerichtlichen Medizin.* Edited by Professor Albin Haberda. Tenth edition. Vienna: Urban and Schwartzenberg. 1923.

[3] *The Therapeutic Use of Digitalis.* By G. Canby Robinson. Medicine Monographs. Vol. I. Baltimore: Williams and Wilkins Company. 1923. (Med. 8vo, pp. 137. U.S., Canada, Mexico, Cuba, 2.50 dollars; other countries, 2.75 dollars.)

THE ACTION OF RADIUM.

THE Jacksonian Essay on *The Effects of Radium upon Living Tissues*,[4] by Dr. SIDNEY FORSDIKE, has together with a paper on the treatment of haemorrhage by radium, been published as a separate volume. The author describes a series of experiments in which the ovary of the cat was exposed to the action of varying doses of rays for periods ranging from half an hour to twenty-four hours. The animals were allowed to survive for from thirty-six hours to twelve weeks. The general conclusions are that with strong doses of radiation, where the radium is brought into direct contact with the tissue, the effects are procured in a few hours. With moderate doses there is a definite latent period before any change is noted, but though delayed the microscopical changes are identical. The author states that apart from the engorgement of vessels and haemorrhages, the first noticeable effect is upon the nucleus of the primary follicles; fragmentation of the chromatin occurs, but the cytoplasm only shows changes later; he concludes that the cell is probably killed by action upon the nucleus. Radium rays, he states, show a differential action upon vital cells; endothelium of vessels, ovarian follicles, lymphatic tissues, and white blood cells are rapidly destroyed, whereas nervous, fibrous, and cartilaginous cells are more resistant. This differential action is most marked in rapidly dividing and embryonic tissues. The author has treated fifty cases of carcinoma of the uterus, vagina, and vulva with radium. He concludes that the younger the patient the worse is the outlook, and that the best results are obtained from patients at, or following, the menopause. The prognosis in the endocervical type of carcinoma is grave, as it is rarely diagnosed in the early stage. Of squamous carcinoma, the fungating type responds to treatment better than the ulcerative. Three of the cases were treated in the early stage of the disease; two of these were alive and well eighteen months after treatment and there was no sign of recurrence. The remaining forty-seven cases were inoperable. Four of these were clinically free from disease six to twelve months after treatment; eight remained unrelieved; three were lost to observation, and the remaining twenty-nine received marked benefit from cessation of haemorrhage, relief of pain, and modified discharge.

CYSTOSCOPY.

THE success of the book on cystoscopy and ureteral catheterization, by Drs. G. MARION and M. HEITZ-BOYER, has induced the authors and publishers to produce a second edition.[5] Several noteworthy changes have been made.

In the first place the work is issued as a single volume, and a certain amount of space has been saved by insisting less on the distinction between cystoscopy with instruments giving a reversed image and cystoscopy with the image corrected. In the opinion of the authors every urologist should be capable of using both instruments with equal facility. Moreover, the chapter on the optics of cystoscopes and the interpretation of images has been entirely remodelled, and this somewhat dry subject has certainly benefited by the rewriting.

An excellent chapter is that which deals with the cystoscopy of patients suffering from enlargement of the prostate. The authors have long been recognized authorities on the cystoscopic appearance of enlargement, and their description of the vesical aspect of an enlarged prostate is excellent. Great emphasis is laid on the importance of ascertaining the relation of the vesical neck to the ureteral orifices. As the authors point out, in a normal bladder it is impossible to view simultaneously in the same field the bladder neck and the orifices. When hypertrophy exists, even when it is still slight, it is possible to see at the same time, and in the same field, the neck of the bladder and the ureteral orifice. This is due to the fact that when the neck is raised by enlargement of the prostate the prism of the cystoscope embraces a much larger field, the size of the image of the ureteric orifices being, of course, at the same time reduced. In cases of very marked enlargement, on the other hand, the orifices are completely shut off from view by the prostatic projection. The chapter on hypertrophy of the prostate is well illustrated with diagrams and coloured plates.

The section of the book dealing with operative cystoscopy has also received attention, chiefly in that part that concerns treatment by high frequency and diathermy. It will be remembered that the treatment of new growths of the bladder by high frequency was put into practice more or less at the same time by Beer and Keyes in America and by Heitz-Boyer and Cottenot in France; but whereas Beer employed direct action by electro-coagulation, Heitz-Boyer and Cottenot had recourse to action at a distance by means of a spark. In consequence it is not surprising to find in the work under review enthusiastic advocacy of sparking. By this method the papilloma is destroyed, not so much by heat as by the disruptive action of the sparks. The authors employ it not only in the treatment of new growth but also in that of tuberculosis of the bladder—a very intractable lesion. The cases of tuberculosis in which it would appear to be of special value are those in which the bladder lesion is discrete and localized—for example, an ulcer. Where the lesion takes the form of a general or widespread cystitis accompanied by intense oedema the treatment would seem to be of little use. It would also appear to succeed in cases of persistent tuberculous granulations, and is to be regarded as a supplementary method of treatment where nephrectomy has led to improvement, but not to the entire clearing up of the bladder condition. Some excellent coloured plates are given of a case of tuberculous ulceration treated by high frequency. Another lesion in which sparking would appear to be useful is intravesical prolapse of the ureter; the authors are definitely of opinion that the results obtained from sparking are better than those obtained from electro-coagulation.

The art of pyelography has also advanced since the appearance of the first edition in 1914. Various pyelograms are included in the new work. The examples of normal renal pelves are excellent, but in selecting an illustration of a pyelogram of hydronephrosis it would have been better to have chosen a less advanced case. An advanced case of hydronephrosis can be diagnosed apart from pyelography, and it is in the detection of the earliest changes in the pelvis and calyces that pyelography is of such service. The authors have not emphasized this point sufficiently, nor dwelt enough on the interpretation of pyelograms that show an early stage of dilatation. Surely it is only by a better knowledge of the beginning of hydronephrosis that progress will be made and that kidneys otherwise condemned to destruction will be saved.

The first edition of this work is sufficiently well known to make it unnecessary to write at greater length on the merits of the second. A perusal of its pages should be sufficient to convince the most sceptical of the importance of modern urological methods in the diagnosis and treatment of lesions of the genito-urinary tract.

CONGENITAL HIP DISLOCATION.

IN *La luxation congénitale de la hanche*[6] Dr. P. LE DAMANY of Rennes attempts to solve the long discussed problem of the etiology of congenital dislocation of the hip. The causes of this deformity and its sexual distribution have up to the present time defied investigation.

According to Dr. P. Le Damany the causa causans is the cerebral development of man, and the consequent increase in size of cranium, which by necessitating a more capacious pelvis has caused disadvantageous changes in the position and form of the acetabulum. He quotes statistics to show

[4] *The Effects of Radium upon Living Tissues, with Special Reference to its use in the Treatment of Malignant Disease.* By Sidney Forsdike, M.D., B.S.Lond., F.R.C.S.Eng. London: H. K. Lewis and Co., Ltd. 1923. (Demy 8vo, pp. 72; 42 figures, including 9 plates. 5s. net.)

[5] *Traité Pratique de Cystoscopie et de Cathétérisme Urétéral.* Par G. Marion et M. Heitz-Boyer. Deuxième édition, entièrement refondue. Paris: Masson et Cie. 1923. (Roy. 8vo, pp. 480; 214 figures, 48 plates. Fr. 100.)

[6] *La luxation congénitale de la hanche.* Par Dr. P. Le Damany. Bibliothèque des connaissances médicales dirigées par le Dr. Apert. Paris: E. Flammarion. 1923. (Cr. 8vo, pp. 246; 149 figures. Fr. 10.)

that in the yellow and negro races this congenital dislocation is much more rare than in the white races, and he associates this rarity with the less highly developed brain of the negro and the yellow man. No reference is made to the indisputable fact that the pelvis of the anthropoid apes is far more capacious than that of man, a fact which entirely upsets his theory that pelvic development necessarily depends on the size of the foetal skull.

Dr. P. Le Damany makes the surprising statement that in some parts of Brittany, in which province he practises, there is one case of hip luxation to every sixty or seventy inhabitants and that its frequency constitutes a real public calamity. He does not drive his argument home by insisting that this frequency is due to an overwhelming intellectual superiority of the Breton Celt over the Teuton and the despised Sassenach. In this country there has been no census of cripples and therefore exact comparisons are impossible, but it is obvious from the statistics of our hospitals that the frequency of the deformity here cannot be a tithe of that in Southern Brittany, for it occurred in less than 1 per cent. of 5,000 orthopaedic cases. In Germany, according to Hoffa writing in 1891, there were only seven congenital hip dislocations in 10,000 surgical cases. The very fact of the extreme regional variability of the frequency of the deformity recorded by the author surely shows that some factor other than mental development has a preponderating influence on its incidence.

Dr. Le Damany also claims to have accounted for torsion of the upper end of the femur, which he regards as a cause and not as a consequence of its displacement, but we are not convinced by his argument; in fact we cannot admit his premisses.

The vast field of experience which Brittany has apparently afforded to the author makes us turn with great expectation to the section of the book on treatment. In this we are not disappointed, although it contains little that is new, except the description of the author's method of treatment after the first plaster appliance is removed. He advocates a combination of plaster-of-Paris and steel apparatus, designed to allow of limited movement, with the intention of encouraging joint development by use. It may be doubted whether the same end is not attained by the ordinary plaster appliance, which generally allows of movement to a greater or less extent. We should have liked to know what degree of success Dr. Le Damany has had, but beyond stating that in very young children (presumably under 2 years of age) 95 per cent. may be counted as cured, he modestly refrains from making any categorical claims to success. We believe that in this country most orthopaedic surgeons consider that the difficulties of treating very young children outweigh the advantages to be hoped for from early attempts at reduction of dislocation.

Though we cannot accept all Dr. Le Damany's conclusions we must pay full tribute to his research and industry and to the ingenuity with which he has attempted to explain the etiology of a deformity, which still continues to baffle the pathologist.

The publishers state that this series is intended for the instruction of the general public, and that this book will interest the 120,000 French people who are the subjects of congenital hip-luxation, but we judge it to be too technical for a popular work.

NOTES ON BOOKS.

A HANDY pocket book on *Hygiene and Disease in Eastern Tropical Africa*,[7] prepared on behalf of the Admiralty and the War Office, has been issued by H.M. Stationery Office as a supplement to the *Handbook of German East Africa*. The compiler, who is anonymous, writes after an experience of two periods of about three years each in eastern tropical Africa in the midst of many of the diseases which he discusses, and had no illness of any account owing to the observance of the simple rules which he lays down for steering clear of disease. He has succeeded in producing a little volume that is admirably clear and intelligible. It is well illustrated and has an excellent map of German East Africa showing the distribution of the tsetse fly. It should prove an invaluable companion and guide to all who intend to travel or settle in East Africa, or indeed in any country where tropical diseases occur. Not the least of its merits are its conciseness without loss of any essential matter or of lucidity and the convenient pocket size of the volume. A short section on the protection of aircraft from the attacks of insects gives an account of the insects, such as the wood-boring beetles, which attack woodwork, and the white ants, which are a much more serious danger, as they can summon large numbers to the attack whenever they find a substance suitable for food, thus effecting an astonishing amount of damage in a single night, as those who have lived in India and the tropics know only too well. The most effective means of protecting the structure of aeroplanes from these pests are well described. The Admiralty and the War Office are to be congratulated on the issue of this extremely useful little volume. It is quite the best of its kind.

The possibility of producing adequate supplies of quinine within the empire is discussed in a report[8] issued a short time ago by the Imperial Institute. The extent to which this country depends for its supply on foreign sources is pointed out and a policy of aid by the Imperial and Indian Governments for the more extensive cultivation of cinchona bark suggested. The report also deals with tanning materials in the same way, giving statistics of the trade in Indian myrobalans and indicating the lines on which the production and trade could be improved.

The appearance of a third edition of Professor DENDY'S *Outlines of Evolutionary Biology*[9] calls for no long comment. The book has such a wide reputation, and has met with such a universally favourable impression, that there is little more to be said. It will be a matter for surprise if many more new editions are not called for. The present edition has been revised and brought up to date; as shown, for example, by the inclusion of the experiments of Guyer and Smith and of Cunningham's hormone theory in the chapter dealing with the question of the inheritance of acquired characters—a question of the most vital importance in all matters relating to medicine and sociology. The book deals largely with debatable matter, but the various views are set forth in an unbiased and truly scientific spirit. One point worthy of special mention is the completeness and accuracy of the index, which enhances the value of the book. Index compiling is a dreary occupation and in a book of this character with so many cross-references a very difficult one, but the result is excellent. Professor Dendy is to be congratulated very sincerely on the appearance of this edition. Like its predecessors it is admirably written, filled with information well presented and extremely interesting; what more can be desired?

We have received from the publishers a copy of a new professional directory entitled *London Doctors and Dental Surgeons, 1923–1924*.[10] The first part gives a list of registered medical practitioners practising in Greater London, including Beckenham, Bromley, Croydon, Ilford, Kingston, Richmond, Surbiton, and Woodford. The second part gives a list of "legally qualified (registered) graduates and licentiates in dental surgery" practising in the same area. In size and shape of page, in style and size of type, in tabular arrangement of the entries, as well as in colour and style of binding, this directory bears the strongest possible resemblance to the *Medical Register*; in bulk it corresponds more nearly with the *Dentists Register*. The preface states that no name is printed which for any reason does not appear in the *Medical* or *Dentists Register*, as corrected up to May 31st, 1923, by the General Medical Council or the Dental Board. The brief information appended to each name is arranged in vertical columns. In the medical section each page has five columns, and in the dental section four. The names of dental surgeons who are also registered medical practitioners appear in both sections. The personal particulars given are stated to be those furnished by the practitioners themselves; but "where no return was received, or information was forthcoming too late for incorporation in the present edition, the matter actually appearing is taken from the *Medical* and *Dentists Registers*, amplified wherever possible by available official data."

[7] *Hygiene and Disease in Eastern Tropical Africa: Protection of Aircraft from Attacks of Insects.* Prepared on behalf of the Admiralty and War Office. London: H.M. Stationery Office. 1923. (Pp. 58; with 21 figures and 1 map. 2s.)

[8] *Drugs and Tanning Materials: Reports on Cinchona Bark and Myrobalans.* Imperial Institute Indian Trade Inquiry. London: J. Murray. 1922. (Med. 8vo, pp. viii + 59. 4s. net.)

[9] *Outlines of Evolutionary Biology.* By Arthur Dendy, D.Sc., F.R.S., Professor of Zoology, University of London. Third edition, revised and enlarged. London: Constable and Co., Ltd. 1923. (Demy 8vo, pp. 421; 190 figures. 16s. net.)

[10] *London Doctors and Dental Surgeons, 1923–1924.* London: The Grafton Publishing Co. 1923. (Sup. roy. 8vo, pp. 292. 15s., post free 15s. 6d.)

MEDICAL AND SURGICAL APPLIANCES.

FUMIGATION OF SHIPS.

THE fumigation of ships by hydrocyanic acid gas is the routine method for the destruction of rats and other vermin practised by the United States port health authorities, and it has been adopted occasionally in England. The gas is recognized to be the most effective agent available, but unfortunately there have been some fatal accidents among men engaged in carrying out the procedure with the more or less makeshift appliances hitherto used. Aided by a grant from the Indian Research Fund Association, Lieut.-Colonel W. Glen Liston, I.M.S., Director of the Plague Research Laboratory, Bombay, spent some years in planning and perfecting a machine, the use of which would eliminate all risk during the procedure of fumigation and would enable it to be carried out more expeditiously and with knowledge of what was actually happening in the different parts of the ship into which the gas was distributed. Colonel Liston described the machine in 1920 (*Indian Journal of Medical Research*, vol. vii, p. 778 et seq.), but a considerable period lapsed before he had an opportunity of carrying out on a ship a test experiment enabling its efficiency and safety to be compared scientifically with that of the "dumping fixture," which is the appliance hitherto used by the American port authorities. He has now described, with Mr. S. N. Gore in the current number of the *Journal of Hygiene* (vol. xxi, No. 3, May, 1923, p. 199), the results of this test experiment as carried out on the Royal Indian Marine Ship *Canning* at Bombay.

The dumping fixture consists of a barrel to the upper edge of which one or two boxes are fixed on hinges. The barrel holds a strong solution of sulphuric acid, while the boxes are filled with sodium cyanide. The contents of the boxes can be tilted into the sulphuric acid when desired by drawing upon cords adjusted suitably for the purpose, and hydrocyanic gas is generated. No special arrangement is made to distribute the gas, and the quantity evolved depends on the quantity and quality of the sodium cyanide used. The concentration of the gas present in the space under treatment is not estimated at any stage in the process and no means are provided for getting rid of the poison after it has accomplished its work other than the natural ventilation existing on the ship.

In Liston's cyanide fumigator the gas is generated in a closed box which is placed in the open air. On the lid of the box a petrol motor, a fan, and a chemical cabinet are fixed. The motor is capable of revolving the fan at a speed of 3,600 revolutions a minute, and at this speed it can draw into the generating box through an inlet pipe six inches in diameter and deliver through an outlet pipe of the same diameter 1,200 cubic feet of air a minute at a pressure of six inches on a water gauge. The apparatus and chemicals required for generating, measuring, and testing the poison gas are contained in the chemical cabinet. The gas is evolved within the generating box by allowing a solution of sodium cyanide to mix with a solution of sulphuric acid on a mixing platform within the box. The quantity of poison gas evolved is regulated by the rate at which the two liquids are allowed to flow upon the mixing platform. This is controlled by two screw clamps fixed on the rubber tubing which conducts the fluids from the vessels in the chemical cabinet into the generating box. When the motor is working the poison gas is diluted as rapidly as it is generated with air drawn by the fan from the compartment under treatment through the inlet pipe connecting the generating box with the compartment. The poison gas, diluted in this way, is at once blown back by the fan along an outlet pipe connecting the fan and generating box with the compartment. The outlet pipe extends into the compartment for a considerable distance; it is furnished with a number of branches of gradually decreasing diameter so that the diluted gas is carried to the remotest parts of the compartment and delivered there at from eight to ten different points. These points may be selected on the various decks of the ship. The air and poison gas within the compartment are thus continuously circulated through the generating box where more poison gas can be added at will till such a concentration is obtained as is required for the purpose aimed at—it may be the destruction of rats or bugs or fleas or other vermin. The concentration of the poison gas in the air circulating through the machine can be estimated at any time by stopping the generation of the gas for a few minutes while a measured volume of the air mixed with poison gas is taken either from the outlet pipe from the fan or, by making special arrangements, from any part of the compartment under treatment. The apparatus and chemicals for this purpose are provided in the chemical cabinet fixed to the machine.

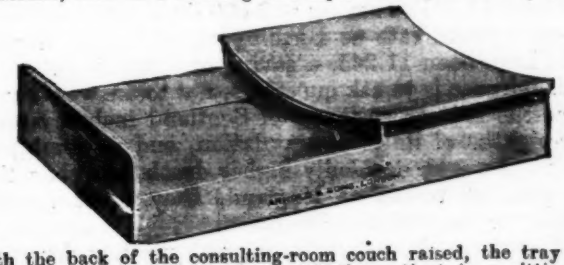
Liston's fumigator thus differs from the dumping fixture in that (1) the poison gas is rapidly diluted with air as soon as it is generated so that high concentrations are avoided; (2) the evolution of the gas is constantly under control during the whole period of fumigation; (3) the concentration of the poison gas within the room can be estimated at any time; (4) the distribution of the gas in the compartment is assisted by mechanical means so that a more rapid and even distribution is effected; (5) the poison gas can be displaced by fresh air when its work is accomplished, a system of artificial ventilation assisting the natural ventilation of the ship.

The machine is portable and can be carried by two men. It can deal with 60,000 cubic feet of space at one time, and a number of machines or units are required for the fumigation of a ship. The units should be used simultaneously so that the whole ship is fumigated at one time. The period required for completing the process is from three to four hours. A port health officer should be provided with at least ten units or machines.

The experiments detailed by the authors in their paper demonstrate clearly the defects and dangers of the dumping fixture and the advantages of the fumigator. They show, for example, that when the dumping fixture is used the gas is evolved with great rapidity, so that very high concentrations of the poison gas are found in the neighbourhood of the fixture. The gas does not diffuse evenly from this point but convection currents are set up which carry the poison gas in high concentration often to remote parts of the compartment under treatment. If enclosed or partly enclosed spaces are encountered in the path of these currents pockets of poison gas in high concentration are liable to develop while the gas may be present in quite low concentration in the immediate neighbourhood of these pockets. It is for this reason that fatal accidents are liable to occur when cyanide fumigation is undertaken with the dumping fixture. The experiments also show that even as long as two hours after starting an experiment with the dumping fixture the gas remains very unevenly distributed in the compartment. In one experiment, for example, when tests were taken simultaneously from eleven points in the compartment 112 minutes after starting the experiment the concentration of the poison gas varied between 22 and 96 parts per 100,000. On the other hand, when the fumigator was used in similar circumstances the concentrations varied only between 22 and 53. A concentration as high as 42 parts per 100,000 was met with in one experiment two hours after opening up the compartment when the dumping fixture had been used, while the highest concentration, only one hour after opening up, was 26 parts per 100,000 when the fumigator was employed. Further, while 7 lb. of sodium cyanide scarcely sufficed to kill all rats when the dumping fixture was employed, 6 lb. were sufficient to kill all rats with the fumigator. The use of the fumigator ensures safety—first, because the poison gas is generated in the open air; secondly, because it is rapidly diluted so that high concentrations are not developed and pockets of poison gas in high concentration are avoided. The concentration of the gas in the compartment can be ascertained by a simple chemical test so that variations in the volume of the gas evolved by different samples of cyanide are counteracted while additional quantities of gas can be added at any time to make up for loss by leaks or by absorption; the concentration of the poison gas in all parts of the compartment, too, is more rapidly and evenly attained. As the fumigator is economical in the use of cyanide and acid, the saving thus effected goes far to cover the greater primary outlay and running expenses of the fumigator as against the smaller cost and maintenance charges of the dumping fixture.

Combined Irrigation Tray and Pelvic Rest.

Mr. T. B. MOUAT, F.R.C.S. (Assistant Surgeon, Sheffield Royal Infirmary), writes: The combined irrigation tray and pelvic rest illustrated below is a convenience to the surgeon as it enables him to use a cystoscope, or any other irrigating bladder or urethral instrument, on an ordinary consulting-room couch, or theatre operating table. It does away with the necessity for an expensive special table, and overcomes the objections (instability, splashing of couch and towels) which arise from the use of a makeshift, such as a sandbag and separate tray or kidney basin.



With the back of the consulting-room couch raised, the tray can be used for urethral irrigation with the patient in a sitting or reclining posture; with the couch flat it gives the necessary pelvic elevation for a cystoscopic examination. The combined tray and rest is strongly made to carry a stout patient, and is finished in white enamel. It has been made for me by Messrs. Arnold and Sons of 50-52, Wigmore Street, W.1.

British Medical Journal.

SATURDAY, SEPTEMBER 22ND, 1923.

THE HEALTH OF SCOTLAND.

ELSEWHERE in this issue (p. 540) are given some striking statistics drawn from the report for 1922 of Dr. A. K. Chalmers, M.O.H. Glasgow. They relate not merely to the great city on the Clyde, but to Scotland as contrasted with England and Wales. Taking first the cities of the two countries, the mean of the all-age death rates of the three years 1920-21-22, in London was 12.8 per 1,000 living, in Liverpool 15.0, in Manchester 13.8, and in Birmingham 12.0. In Scotland the comparable figures were—Edinburgh 14.3, Aberdeen 15.1, Dundee 15.4, and Glasgow 15.9. Next, comparing England and Wales as a whole with Scotland as a whole, the death rate of Scotland since 1861 has been higher by either 1 or 2 per 1,000 per annum in every decennium excepting 1881-90, when the rates were equal. The facts as to infant mortality are even more arresting. In 1861-70 there were in England 154 deaths per 1,000 births, and in Scotland only 121, a difference of 33 in favour of Scotland. But after that time the difference so diminished that in 1901-10 Scotland had an advantage of only 14 instead of 33. In 1911-20, for the first time in those sixty years, the rate in England was lower than in Scotland by 6 per 1,000. It is not that Scotland has been standing still. In 1891-1900 its figure was 128, and in 1911-20 it was only 106; but in England, whilst the rate was 153 for 1891-1900, it had fallen to 100 for 1911-20.

These comparisons, so disadvantageous to Scotland, suggest serious questionings. Why is it that the mortality of Scotland for all ages is persistently higher than that of England? An excess of even 1 per 1,000 per annum means close on 5,000 extra deaths every year. Comparing Glasgow, which has the highest death rate of the four great towns of Scotland, with the four greatest English cities, and confining the comparison to 1921, the healthiest of the past three years, the position is as follows. Glasgow had 16,051 deaths; if it had had the same death rate as Liverpool (14.3) its deaths would have been 15,200, a saving of 851 lives. If it had had the same death rate as Manchester (13.6) it would have had 14,456 deaths, a saving of 1,595 lives. If it had had the same death rate as London (12.4) its deaths would have been 13,171, a saving of 2,880 lives. If it had had the same death rate as Birmingham (11.2) its deaths would have been 11,243, a saving of 4,808 lives.

Our purpose is to ask questions, not to answer them; but as the four great towns of Scotland include about three-eighths of its total population, and as combined they have a very decidedly higher death rate than the four greatest towns of England, they must largely account for the national difference.

We pass on, however, to suggest matters for consideration as to the high urban death rates of the northern kingdom. Housing at once suggests itself, and there can be no doubt of its immense influence. In his admirable health history of Manchester noticed in last week's issue (p. 468), Dr. Niven describes it as a city of cottage dwellings, the prevailing type being the four-, five-, or six-roomed house. How infinitely better this is than the great four-story buildings of Glasgow, with multiple houses on every floor, packed full of humanity in dwellings mostly of two apartments, but not infrequently of one; all reached by a common stairway which conveys not only human traffic, but some share of every kind of atmospheric pollution resulting from the overcrowding. This is no modern phenomenon; it is the growth of centuries. The reason probably is that Scotland was in past times a poor country, whose inhabitants could not afford such houses as were practicable in the South, so that a custom became established of a Scotsman having a smaller dwelling than an Englishman. At the best improvement here can only be gradual. It would take an earthquake to effect a clearance. Nor will the housing habit be broken by the bellowings of the Clydeside no-renters, who do so much towards preventing unaided private enterprise from resuming its building function. Neither local authorities nor central authority are too much to be blamed for evils which have their roots deep in the past, and health reports such as that of Dr. Chalmers show how strenuously evils are being tackled in the present day.

Closely associated with overcrowding is the question of domestic cleanliness with all its obvious relations to health, and especially to the health of infants and children. Is the standard of cleanliness lower in Scotland than in England? Does milk, for example, keep as well in a two-roomed dwelling in a great tenement building in Bridgeton as in a separate house in a street in industrial Old Trafford? If not, is the difference wholly due to the house, or partly to the housekeeper? Can school medical inspectors and health visitors make any comparison here between England and Scotland in respect, say, of cleanliness of skin and hair and clothing and of the dwelling itself? If there is a difference no doubt it is being much diminished by such agencies.

A third question—and it cannot be shirked—is the comparative prevalence of alcoholism in the two countries. The spectacle presented by Argyll Street and Trongate in Glasgow on a Saturday night has often been commented on by visitors, and no doubt also by residents, though these may be compelled to silence by shame. Is that to remain a permanent disgrace, or will the coming vote under the Temperance Act do something to diminish it? The influence of alcoholism on the life and health of the victims themselves, and almost as directly on the life and health of their offspring, and on housing and domestic comfort, indeed on all the problems of sociology, needs no emphasizing.

These three subjects—housing, cleanliness, and alcoholism—are closely intertwined. Better houses would promote cleanliness and temperance; greater domestic cleanliness and comfort would provide a counter-attraction to the drink shop; less money spent on drink would leave more for house rent and food and clothing; parental sobriety would mean a cleaner house and better cared-for children. It does not matter where the cutting of the vicious circle begins; improvement in one direction will mean improvement in all.

A fourth question is as to atmospheric pollution in the cities of Scotland and of England. The average Scottish coal is dirtier than the average English and Welsh coal. The pall of smoke overhanging great cities is seen by every railway traveller as he

approaches them. It is thicker in Scotland than in England, partly perhaps because the country is colder; but if local density of population is greater in the cities of Scotland, and domestic smoke pollution correspondingly more abundant, that is a condition which is surely much more capable of amendment than housing in general. Can it not be remedied by adopting smokeless methods of heat production in dwellings and factories? It is not necessary to-day to insist on the influence of the exclusion of sunlight by smoke in respect both of tubercle and of rickets. It is known to everyone.

Another question is whether any important racial and sociological changes have taken place and are taking place in Glasgow and the industrial west of Scotland. To what extent is the population losing by emigration to Canada and Australia and the United States men and women typically Scottish in character, of a sort which has been successful wherever it has penetrated? Can there be to a patriotic Scotsman a sadder sight on a Saturday afternoon than that of a great Atlantic liner passing down the Firth of Clyde loaded with emigrants bound for the new world, while the pleasure trippers on the paddle steamers look up and sing, with a quaver in their voice, "Better lo'ed ye canna be, Will ye no' come back again?" And how far has immigration from Ireland, especially from Southern Ireland, replaced the population lost by emigration? To what degree is Glasgow becoming a Scoto-Irish community, and what are the results of the change on social order and general prosperity and public health likely to be?

These are by no means all the questions which arise in connexion with this important subject. Much material now exists for elucidation of rural health conditions. Since county councils began their work, more than thirty years ago, the annual reports by their medical officers must have accumulated a mass of information well worth collection and analysis. These reports relate only to non-burghal areas, but any investigator would have to note that various thickly populated and industrial communities have elected to remain under county government rather than municipalize themselves. Apart from such reservation the influence of climate on health could be suitably studied by means of the county reports. The lower rainfall and more bracing climate of the east of Scotland could be compared, in its effects on public health, with the much moister and more relaxing climate of the west, likewise the higher temperature of the southern counties with the colder highland regions. The influence of insularity could be studied in the data for Orkney and Shetland and the Hebrides. The attention now given to infant and child welfare, the health of children at school, and maternity welfare is a comparatively recent development. Material on which to base comparison of activities and results as between area and area must be growing steadily, and should be utilized, both for commendation and for admonition.

Our purpose, as already said, is to ask questions, not to answer them; neither to praise nor to blame, but to urge the far-reaching implications of the comparisons between England and Scotland, and to suggest that there is abundant occasion and opportunity for valuable research into the health problems of Scotland. In these days there is too great a tendency to assume that research can only be conducted in a laboratory, but there is ample opportunity for field work of the best sort. The harvest is ready, and we hope the reapers also may be found.

TUBERCULOSIS: THE PRESENT POSITION.

IN this issue, which contains a larger number of pages than usual, are published the proceedings in the Section of Tuberculosis of the British Medical Association meeting at Portsmouth, under the appropriate presidency of Sir Henry Gauvain, who has done so much at the Cripples' Hospital and College at Alton and at Hayling Island for the non-operative treatment of surgical tuberculosis. This beneficent institution, rightly called after the late Sir William Treloar, whose recent death we deplore, was the home in this country of heliotherapy, and it was therefore right and proper that the Section should discuss the artificial light treatment of lupus and other forms of tuberculosis, under the guidance of Dr. Axel Reyn of the Finsen Institute at Copenhagen, and Dr. J. H. Sequeira of the London Hospital. The Section also considered the present position of the surgical treatment of pulmonary tuberculosis, and the social aspects of tuberculosis, with special reference to its infectivity. Dr. Clive Riviere's British Medical Association Lecture on some pitfalls in the diagnosis and treatment of pulmonary tuberculosis, and two contributions on the complement fixation test in tuberculosis, by Drs. A. L. Punch and A. Hope Gosse of the Brompton Hospital and by Dr. Arthur Sellers respectively, also published in this issue, add to the value of what has become a symposium touching on the several aspects of prevention, diagnosis, and treatment. We publish also records prepared by Dr. Leonard Williams of twenty-three cases treated by the serums and vaccines prepared by M. Spahlinger at his laboratory near Geneva. Lastly, in the course of a review of the fourth annual report of the Chief Medical Officer of the Ministry of Health will be found some results of administrative experience summarized in the light of recent clinical observation with Sir George Newman's customary felicity.

Dr. Jane Walker's opening paper on the social aspects of tuberculosis bears witness to the difficulty of explaining the steady fall of the tuberculosis mortality rate during the last 150 years; for if tuberculosis is largely an industrial disease the conditions in this respect alone can hardly be regarded as more favourable since the industrial revolution which began at the end of the eighteenth century and led to the transfer of so large a proportion of the population from the country to towns. Many factors in the standard of living are no doubt concerned, and especially food, on which other speakers, such as Dr. C. Muthu from Indian statistics, rightly insisted. Incidentally Dr. Jane Walker suggested that the invention of cheaper materials for clothes, thus obviating the inheritance of dresses from one generation to another, may not have been without its influence. That for infection to take place massive dosage and close and prolonged association are necessary she illustrated in various ways.

Dr. H. Batty Shaw pleaded with no uncertain voice for the sterilization of tuberculous cow's milk, and for the removal of persons discharging tubercle bacilli from [illegible] childhood of children, which is a possible step, and not from contact with other adults, which he admits to be impossible; if these conceptions were carried out he anticipated that tuberculosis, human and bovine, would be stamped out, and expressed the opinion that other measures were not only useless but wasteful. He insisted on the importance of secondary infection in pulmonary tuberculosis, maintaining that without it tubercle bacilli are not discharged and pneumonic consolidation and excavations do not follow; he

indeed considered it desirable that the old terms "consumption" and "phthisis," which were removed from the official Nomenclature of Diseases (1918) in favour of "pulmonary tuberculosis," should be reinstated. The success of the Grancher method of protecting infants and young children from tuberculous parental infection was described by Dr. G. Brookes Dixon, who approves the use of tuberculin injection for infants thus exposed when separation was not allowed.

While the importance of early diagnosis and efficient treatment by rest at the outset, as described by Dr. Clive Riviere, must be universally accepted, it is also obvious that in the anxiety to secure this ideal there is the real danger of sweeping into the net people who are free from tuberculous infection. This risk of erroneous diagnosis has been estimated to be as high as 60 to 75 per cent. of the cases, and has recently been insisted on by Sir James Kingston Fowler, who has not concealed his critical attitude to modern conceptions of hilum tuberculosis. Dr. Riviere lays much stress on hilum infection, and, indeed, considers that in adult life pulmonary tuberculosis may be due to an extension of this infection from the glands at the root of the lungs, an opinion certainly difficult to establish against the alternative of later and independent infection by inhalation. As early diagnosis in cases in which the result of examination of the sputum is negative is uncertain, and radiograms are subject to fallacious interpretation, the help of the complement fixation test would be most welcome. From their critical survey, based on some 2,500 tests in pulmonary cases and controls and on a review of the literature, Drs. Punch and Gosse conclude that the variability of the results obtained can be partially explained by the different antigens employed. They reiterate their opinion, also entertained by Dr. Sellers, that a positive result indicates an active tuberculous lesion, and that with a few rare exceptions (2 to 3 per cent.) such as very acute, advanced, and moribund patients, a negative reaction is trustworthy evidence of the absence of such lesion. This is a much more assuring statement than that of Aronson and Lewis[1] that the application of the reaction in practice is limited by their observation that 10 per cent. of clinically normal persons give a positive reaction.

The methods of treatment considered are mainly those of comparatively recent date. In his exhaustive and interesting account of artificial light therapy Dr. Axel Reyn recalls Finsen's principle of the two distinct forms of this kind of treatment—the local concentrated action through lenses designed to destroy bacteria and produce inflammation, and the irradiation of the entire body or the light bath—to obtain the stimulating effect on the organism as in surgical tuberculosis; this last was started and early employed by Rollier, for Finsen's death occurred before he could finish his work on this subject. Dr. Axel Reyn does not accept Rollier's opinion that well marked erythema of the skin should be avoided; he believes that the best results are obtained from a light bath if pronounced erythema is produced in the earliest stages of the treatment. For lupus vulgaris the best treatment, as is shown by Dr. Sequeira, is a combination of the local and general light treatment—of concentrated actinic light to the lesions and the exposure of the nude body and limbs to the rays of a large arc lamp.

The discussion on the surgical treatment of pulmonary tuberculosis, introduced by Dr. Gravesen of the Vejlefjord Sanatorium, dealt with artificial pneumothorax and thoracoplasty. In the presence of pleuritic adhesions, which interfere with the efficacy of an artificial pneumothorax, there is a choice between thoracoplasty and Jacobaeus's method of thoracoscopy with endopleural division of adhesions by the cautery. From considerable use and experience of Jacobaeus's procedure Dr. Gravesen sympathetically estimates its value, but concludes on the whole in favour of thoracoplasty for most cases with pleuritic adhesions; Dr. Burrell also agreed that very few cases were suitable for treatment on the lines practised by Jacobaeus. In the course of his opening paper Dr. Gravesen made an interesting digression to point out that, as the outcome of his experience with artificial pneumothorax, he had now adopted as part of the usual method of evacuating pleural effusions, both serous and purulent, the production of an artificial pneumothorax. Among other advantages this tends to prevent the formation of adhesions.

[1] Aronson, J. D., and Lewis: *Amer. Journ. Tuberc.*, 1923, vi, 1024.

OPERATIVE TREATMENT OF MITRAL STENOSIS.

THE ambitious efforts of surgery to remove conditions which physicians are unable to cure has been extraordinarily successful in the comparatively recent past, but hitherto valvular disease of the heart has remained outside the sphere of those who have been described as "physicians who can use their hands." More than twenty years ago the late Sir Lauder Brunton[1] published a "Preliminary note on the possibility of treating mitral stenosis by surgical methods," and, fortified with all the experience of thirty-five years of laboratory work, took out a vivisection certificate and licence to investigate this subject. This novel suggestion was, perhaps not unnaturally, regarded as a somewhat "heroic therapeutic measure," and raised a number of *a priori* objections; but it was not without some supporters. Sir Arbuthnot Lane[2] wrote that some years previously, having gone fully into the matter and concluded that the operation was feasible, he had mentioned it to his colleague Dr. Lauriston Shaw,[3] and had been prepared to act as soon as Dr. Shaw succeeded in finding a case likely to be thus benefited. Dr. Shaw confirmed this conference, which took place about 1890, but added that the *a priori* arguments against operation had appeared so convincing that he had abandoned the idea. At the same time Dr. D. W. Samways[4] pointed out that four years previously he had suggested notching of the stenosed mitral valve as a surgical method of treatment. Experimental surgery then became active in the production of valvular lesions in animals by cutting the aortic or mitral valve segments by a small knife introduced either into the aorta or into the left auricle (Tuffier, Carrel, Cushing, Allen and Graham). Sir Lauder Brunton's suggestion, however, appears to have inspired too much apprehension to be followed except by Doyen, whose patient did not survive the operation. In 1919 H. Vaquez[5] referred such a case to Tuffier, but no operation was carried out, and there have probably been many similar consultations.

A milestone has therefore been reached by the recent publication of a paper by Drs. E. C. Cutler and S. A. Levine[6] entitled "Cardiotomy and valvulotomy for mitral stenosis: experimental observations and clinical notes concerning an operated case with recovery." This

[1] Brunton, Lauder: *Lancet*, 1902, i, 352.
[2] Lane, W. Arbuthnot: Ibid., 1902, i, 547.
[3] Shaw, Lauriston: Ibid., 1902, i, 619.
[4] Samways, D. W.: Ibid., 1902, i, 548; 1898, i, 927.
[5] Vaquez, H.: *Bull. et Mém. Soc. Méd. des Hôp. de Paris*, 1919, 3 sér., lxxxii, 159.
[6] Cutler, E. C., and Levine, S. A.: *Boston Med. and Surg. Journ.*, 1923, clxxxviii, 1023-1027. A brief note on the case was published in the *Epitome*, September 8th (No. 173).

contribution comes from the surgical clinic of the Peter Bent Brigham Hospital, Boston, presided over by Professor Harvey Cushing, and the Laboratory of Surgical Research of the Harvard Medical School. More than two years' experimental work on the subject showed the authors that only a temporary mitral stenosis could be brought about, and that attempts by various methods, such as partial ventriculectomy, plicating, and plastic operations in the region of the valves, failed to produce a lesion resembling human mitral stenosis. This experience provided knowledge as to the ability of the heart to stand trauma, about the methods of restoring an injured heart to renewed function, and practice in localizing the position of the valves in a pulsating organ.

A point was thus reached when further advance could only be gained by operation on an actual patient. This was performed on May 20th last on a girl, aged 12 years, suffering from mitral stenosis without cardiac reserve, who had repeated attacks of severe haemoptysis. When she was examined after admission the pulse rate was 126, the systolic pressure 98, and the diastolic pressure 64 mm. Hg. The electrocardiograms showed right ventricular preponderance and exaggerated auricular waves, the ventricular complexes being otherwise normal. The operation was performed under ether, the child being in a semi-upright position with the electrocardiographic leads and the blood pressure apparatus connected up. The technique followed was Duval-Barasty's medium thoraco-abdominal pericardiotomy; after opening the pericardium and division of the posterior pericardium and diaphragm towards the suspensory ligament, the pulse had dropped from 180, which it had reached at an earlier stage of the operation, to 120, and the blood pressure from 110 to 50 systolic, the estimations being at times almost impossible. The heart at once responded to 1/2 c.cm. adrenaline chloride dropped on its surface, followed by hot saline solution. The heart was then rolled out to the right, and the valvulotome—an instrument somewhat similar to a tenotome or a slightly curved tonsil knife, familiar from its use in the experimental researches—was plunged into the left ventricle at a point about one inch from the apex, and pushed upwards for about two and a half inches until it encountered what seemed to be the mitral orifice; it was then turned mesially and a cut made in what was thought to be the aortic cusp of the mitral valve, the resistance encountered being considerable; with a rapid turn of the knife a cut was made in the opposite side; the knife was then quickly withdrawn, and mattress sutures already in place were tied over the point where the knife had been inserted. There was absolutely no bleeding. At the termination of the operation, which lasted one and a quarter hours, the pulse rate was 140, the respirations 40, the systolic blood pressure 80, and the diastolic 40. For forty-eight hours there was severe sternal pain with respiration which necessitated a liberal use of morphine; signs of post-operative pulmonary complication of the right upper lobe appeared also, but by the fourth day the improvement was satisfactory. Pericardial friction was subsequently detected; the diastolic thrill and murmur, present before, were diminished, but this diminution may have been due to pericardial effusion; the apical systolic murmur was increased, as if from greater insufficiency of the valve due to the operation. As the date of publication was June 28th, the authors, who must be sincerely congratulated on this brilliant operation, are cautious in avoiding any statement as to the benefit that the patient has received, but they feel that the experience gained in this operation, now for the first time successfully accomplished, has provided technical improvements which should render any subsequent attempt both less dangerous and more likely to be followed by a satisfactory result.

THE SKULL OF SIR THOMAS BROWNE.

SOME eighteen months ago it was resolved that the skull, believed to be that of Sir Thomas Browne, which had been preserved in the museum of the Norfolk and Norwich Hospital for some eighty years, should be replaced in the grave in the floor of the chancel of St. Peter Mancroft, Norwich, from which it had been "knav'd" by a person described as an "acquisitive antiquary." But before this reposition Sir Hamilton Ballance and other members of the staff of the hospital considered it desirable that the skull should be examined, and for this purpose sent it to Sir Arthur Keith at the Royal College of Surgeons of England. The story was told, with some preliminary observations, in our columns by Canon Meyrick, the Vicar of the parish, on May 6th, 1922, and subsequently Sir Arthur Keith and Professor Karl Pearson announced that a full account of it would be published. This has been done, and the volume *Sir Thomas Browne: His Skull, Portraits, and Ancestry*, is now before us. The edition is limited to 200 copies at one guinea each, and the names of a few additional subscribers will be received by the Secretary of the Biometric Laboratory of University College, London, W.C.1. The book is an enviable possession. It contains a discussion on the skull and of the portraits of Sir Thomas Browne prepared by Miss M. L. Tildesley, a research worker trained in the exact methods of the Biometric Laboratory of University College, who has in this matter acted in consultation with Sir Arthur Keith, who contributes a short introductory note. Professor Elliot Smith has written a report on the endocranial cast. Miss Tildesley has examined all the portraits supposed to be those of Sir Thomas Browne, and the volume contains thirty-five plates and a folding pedigree. On account of this lavish use of plates the cost of producing the volume has been large, but it is of quite unusual interest and is likely to become, to say the least, one of the curiosities of medical literature. The skull is of peculiar form, being unusually low in front and broad posteriorly; on this account some objections have been made to its ascription, but Miss Tildesley has no hesitation in drawing from all the great mass of evidence she has collected the definite conclusion that it is the skull of Sir Thomas Browne, author of *Religio Medici*, and this opinion appears to be accepted by both Sir Arthur Keith and Professor Karl Pearson. It is confirmed by the discovery of a portrait of Sir Thomas Browne hitherto unknown. It is the property of Mr. Francis Wellesley, who has permitted its reproduction as the frontispiece to this volume; it was originally the property of Mr. Hammond L'Estrange of Hunstanton, and is known as the L'Estrange portrait. It shows a man in early middle age, and a young woman. The portrait of the man was immediately recognized by the Director of the National Portrait Gallery as of Sir Thomas Browne. The young woman is assumed to be his wife, and it is guessed that the picture was painted about the date of their marriage (1641), when he was 36 and she was 19. It was painted on an oak panel and shows in the man a head which "answers in every detail to what the skull would indicate as the appearance of the living head. The nose long and slightly aquiline, the cheek-bone projecting, the forehead normally broad at the level of the eyebrows, but retreating and narrowing abruptly." We hope to notice the monograph at greater length on some future occasion, but meanwhile would repeat that it is an enviable possession, and as the edition is limited applications for copies should be made without delay.

THE UNIVERSITY OF TOKYO.

THE recently published transactions of the Medical Faculty of the University of Tokyo[1] afford good evidence of the activity of that university in the matter of scientific research. They contain more than 600 pages, and the sixteen papers are all of value and some of more than ordinary interest. Omori discusses the question of cardiac inhibition as exhibited in the contractions of the sinus venosus, a part of the heart hitherto very little studied in this connexion. The experiments were made on the heart of the toad, the preparation consisting of a strip of the isolated sinus. He employed both intra- and extra-cardiac stimulation of the vagus, the former by means of muscarin, the latter by electrical stimulation of the nerve trunk, and the contractions were studied under varying degrees of stimulation and in varying metabolic conditions, induced by alteration of the temperature and the tension of the muscle. Among the results observed were the following: (1) The energy and metabolism of contraction are a function of the tissue tension, as in other parts of the heart; (2) the action of the vagus is a function of the tissue tension, and the increase and decrease of the inhibitory action are inversely proportional to the degree of tension, and consequently to the metabolic activity; (3) in favourable metabolic conditions the inhibitory action disappears and acceleration occurs, the evidence pointing to its being due to vagus stimulation; (4) the contractions of the sinus are regular at temperatures between 1° and 35° C., but show a gradual increase between 5° and 30° C., represented on the myogram by a straight line and indicating a metabolic activity increasing with the temperature; (5) the action of the vagus is a function of the sinus temperature; increase and decrease of inhibition stand in inverse relation to rise of temperature—that is, to the metabolic activity; (6) in favourable metabolic conditions inhibition disappears and is replaced by acceleration. Omori inclines towards Verworn's theory of dissimilation; he imagines an automatic centre outside the contractile substance, the rhythmical activity of which may be affected by vagus stimulation interrupting the rhythmical stimuli (stillstand), slowing the rhythm (chronotropism), or by acceleration, the diminution in contractile power then observed (inotropism) being associated with a partial dissimilation palsy of the muscle, leading to smaller and shorter contractions. Gyotoku and Momose have a paper on the metabolism of four cases of Addison's disease. Their general conclusions are: (1) that there is never any marked hypoglycaemia; in one severe and fatal case there was a slight decrease in the blood sugar as the general condition deteriorated; (2) that the action of adrenaline as regards pulse and blood pressure is similar to that in the healthy subject; (3) that the alimentary glycaemia occurring in Addison's disease is the same as in the healthy subject; (4) that with regard to protein metabolism, the nitrogen balance was negative in the two severer cases, and positive in the two slight cases; no definite conclusion could be reached as to whether an increase or decrease was the rule; (5) in all cases there was a marked negative balance for calcium and a positive balance for phosphorus. Kira contributes a paper on the rapidity of *post-mortem* autolysis of glycogen in the liver. He used the toad and the rat as examples of cold-blooded and warm-blooded animals respectively. In the former glycogen disappeared very slowly, and no marked difference was observed as between the hibernating and the waking conditions. In the rat the rate of disappearance was greater but not markedly so, and the author's experiments seemed to show that the difference was due, not to any difference in the amount of diastase present, but to a greater stability of the glycogen in the toad. Other papers deal with the healing-in of foreign bodies in the lung, and the epithelial hyperplasia associated with it; calcium and magnesium metabolism, more especially in relation to the percentage of these compounds in the blood; the influence of the thymus on the growth of bone; the virus of rabies; diabetes and the haemolytic action of glucose; gastric secretion and hyperacidity; the cerebro-spinal fluid; primary diseases of the lymphatic system; Schede's operation for empyema; and the pathogenesis of circulatory failure in pneumococcal pneumonia. No man of science in this country or indeed in the whole world can turn over the pages of this volume without a feeling of intense sympathy with these fellow workers in the cause of humanity in the tragedy that has overwhelmed their city. The Japanese have always been regarded by us Westerners as born masters in the fine arts, and foremost in the genuine love of Nature; and the manner in which they have, in recent times, stepped forward into the line of modern scientific progress is one of the wonders of the age. The calamity that has befallen them will be felt as a calamity to the whole world.

[1] *Mitteilungen aus der Medizinische Fakultät der Kaiserlichen Universität zu Tokyo.* Tokyo: Kaiserlichen Universität. Band XXIX, Heft 2 (Imp. 8vo, pp. 420). Band XXIX, Heft 3 (Imp. 8vo, pp. 422-624; illustrated). Band XXX, Heft 1 (Imp. 8vo, pp. 206; illustrated).

A HOSPITAL HEALTH CENTRE IN WALES.

CARDIGAN has set an example which may well be imitated by other towns not only in Wales but in England; it has established what practically amounts to a health centre such as was conceived in the report of the Consultative Council of Medical and Allied Services, presided over by Lord Dawson of Penn. It may be described, perhaps, as a cross between a primary and a secondary health centre as outlined in that report. It has the cordial support of the medical profession in the district and the great advantage of the services of Sir John Lynn-Thomas, who resides in the neighbourhood and acts as a consulting and operating surgeon; it can also command the assistance of Mr. Wade of the Cardiff Royal Infirmary. The Cardigan and District War Memorial Hospital, founded less than two years ago, has been for the present completed by the establishment of an out-patient department and clinics. The clinics will include child and maternity welfare, and tuberculosis. The new buildings were opened last week by Mrs. Lloyd George, when a public meeting was held under the presidency of Mr. John Evans, chairman of the Hospital Executive Committee, who referred to the gift of *x*-ray apparatus made by the ex-service men of the district. He also mentioned that a motor ambulance station had been established in the yard of the hospital through the gift of an ambulance by the Joint Ambulance Committee of the British Red Cross and the Order of St. John. A short address on the maternity and child welfare scheme was given by Dr. Meredith Davies, M.O.H. for Cardiganshire, who said that the infant mortality for the county had declined from 130 in 1911 to 60 in 1920; this he attributed to the operations of the child welfare scheme. He also spoke of the importance of the maternity work for the expectant mother, and prophesied that in a short period all confinements would take place in hospitals. After a short speech from Mr. Ernest Watkins, secretary to the Welsh Department of the Ministry of Health, Dr. Lloyd, county tuberculosis officer, congratulated the Committee and the people of the district on behalf of the Welsh National Memorial Association. The hospital and the clinics formed a fitting memorial for the glorious dead, and would be a lasting memorial also to Sir John Lynn-Thomas, who had not only taken a large share in the foundation and organization of the hospital, but had placed his skill as an operator at its disposal. Dr. Lloyd went on to say that the mortality from tuberculosis was steadily declining in the county; in the period 1875 to 1914 the average was 2.8 per 1,000; last year it was 1.63. Dame Margaret Lloyd George, who was very cordially received, said that she first visited the hospital some fourteen months

ago; there were then four beds, now there were fifteen, and the demand was for more. The number of patients so far admitted was 150, and 113 operations had been performed. She appealed to the district to support the institution and to rally round Sir John Lynn-Thomas and the other members of the medical profession in the district who were working at and for the hospital. The mayor, after mentioning that Sir John Lynn-Thomas had presented all his surgical instruments to the hospital, and also the nucleus of a medical library, called upon him to speak. Sir John Lynn-Thomas said that the hospital still wanted a research department. If the causes of diseases were discovered their prevention would follow almost automatically. Cardigan had done better than any town in Wales in regard to the hospital, and he knew no town in England which had done as well. The hospital, he said, had a flat roof, which could be used for the sun and open-air cures, as well as a good garden, with exposure to the south. Votes of thanks by Mr. John Evans to Mrs. Lloyd George were passed by acclamation.

THE SCANDINAVIAN MEDICAL JOURNALS.

WITHIN the last few years there have been important changes in the medical journals of Scandinavia. Before the war each of the Scandinavian countries had its own medical journals published in the language of the country. The Swedes and Finns wrote in Swedish, and the Danes and Norwegians in Danish and Norwegian. The worst feature of this arrangement was the isolation it entailed; an important discovery published in Norwegian might easily be overlooked by the rest of the world, and when the same discovery was made some years later in another country no credit was given to the author, whose publication still languished in the obscurity of a Scandinavian language. More than one instance of such an oversight could be given, and in consequence of this difficulty Scandinavian workers were beginning some years ago to publish their observations abroad, notably in Germany. This procedure also had its drawbacks. The bulky and numerous journals of pre-war Germany proved a capacious burying-ground in which the identity and nationality of the foreigner were often lost. To meet these two difficulties—that of publication in an unfamiliar tongue or in a foreign journal—the leading Scandinavian medical authorities decided on a wise compromise which consists of pooling all original Scandinavian work in a series of special journals or *Acta*, in which articles are published in one of the three languages, English, French, or German. In addition to *Acta Medica Scandinavica* there are various other *Acta*, including *A. Surgica*, *A. Radiologica*, *A. Paediatrica*, *A. Dermato-Venereologica*, and *A. Oto-Laryngologica*. Each *Acta* is conducted by an editor and a staff of associate editors, and the journals appear at irregular intervals according as the supply of material and other considerations permit. The standard of these publications is high, and already authors in Holland, Germany, and the countries carved out of the old Austrian Empire have sought the hospitality of their columns. It is not difficult to explain the reasons for the high standard of Scandinavian medical work in general and publications in particular. The Scandinavian is a good linguist, and it is rare to find one who holds an important hospital appointment and who cannot read English, French, and German. It follows that he is more likely to be conversant with medical research throughout the world than many of his English, French, and German brethren. Another advantage of belonging to a small country is the bird's-eye vision, perspective, and freedom which this outside position confers. The development of the young Scandinavian scientist is seldom stunted by some dominating personality in his own country. In Germany, for example, there have been times when not to follow Virchow or Koch blindly was tantamount to segregation among Philistines. Feeling at liberty to pick and choose at their own sweet wills the Scandinavians have never committed themselves wholesale to any special school of thought, and, while seeking inspiration from abroad, they have not been slow to pursue independent research at home. Yet another factor contributing to the value of their publications is the transparency of the scientific fabric in these northern countries. Everyone knows everyone else, piracy of scientific work is therefore almost impossible, and the publication of pseudo-original articles is likely to bring the author more ridicule from the initiated than kudos from the crowd.

MEDICAL PRACTICE IN NORTH AMERICA.

DR. CECIL BULL, in a note published at page 538, describes some of the merits and some of the disadvantages of medical practice as it is now conducted in North America. Dr. Bull was on the general staff of the Mayo Clinic at Rochester, Minnesota, for two years, and during that period visited other cities and clinics. He considers that the modern intensive training of the medical student in America is not altogether satisfactory in fitting men to become country practitioners, because they feel starved intellectually when not in touch with laboratories equipped with the elaborate instruments to which they have been accustomed, and with a medical society and a medical library. Moreover, they are liable to lack self-reliance. On the other hand, local medical societies are numerous, the output of medical literature is enormous, and much post-graduate knowledge can be obtained at conferences. The Americans are good technicians, fond of instrumental examinations and tests of all sorts. Hence the development of much specialism and a tendency, perhaps, to over-examine the patient. The American medical profession is keen on research, and in its pursuit a vast amount of detailed observation is accumulated which, no doubt, is of very great value provided the observer is not "prevented from seeing the wood for the trees." In clinics such as the Mayo Clinic, with its clerical staff, the doctor is relieved of keeping notes, the filing of records, and much of his correspondence. But he may become a slave to routine, and there must be a temptation to neglect the personal factor in his patient. It is interesting to compare Dr. Bull's article with "Notes on a tour of the principal hospitals and medical schools of the United States and Canada," by Mr. A. E. Webb-Johnson, which have been printed for private circulation by Mr. S. G. Asher, chairman of the council of the Middlesex Hospital Medical School. Mr. Webb-Johnson arrived at New York on February 18th last and left on March 31st. Between those dates he visited Philadelphia, Baltimore, Washington, Cleveland, Chicago, Rochester, Toronto, Ottawa, Montreal, Quebec, Boston, and New York. His notes are a record of an exciting round of hospitals, clinics, laboratories, dinners, teas, meetings, theatres, stockyards, and slaughterhouses. Mr. Webb-Johnson, like Dr. Bull, observed that the undergraduate in America does not have a long clinical training with individual patients, but is instructed more by classes. Consequently, after getting his degree he requires the clinical experience which our students get while acting as clerks and dressers; and the post-graduate problem in America is the provision of courses directly after qualifying rather than to cater for general practitioners who wish to be brought up to date. Mr. Webb-Johnson was convinced of the advantage of special departments properly developed in general hospitals over the system which prevails too much in London of general hospitals with meagre special

departments and small special hospitals poorly equipped and with few facilities for scientific work. He was impressed by the system of clinical records, with its stenographers, clerks, and filing arrangements. Many American surgeons, like Dr. Crile, combine a large amount of research work with their operative practice, and for this purpose they find the clinic system very valuable. At Chicago the College of Surgeons publishes a clinical bulletin daily, showing all the operative work going on in the city. The college also has a department of literary research, which for a small fee will supply a complete bibliography with abstracts of any subject in medicine or surgery. Everywhere, both in the United States and in Canada, Mr. Webb-Johnson saw the utmost keenness and thoroughness coupled with perfect equipment and organization. But he did not observe the same relationship between the student and the patient as there is between the clerk or dresser and the patient in British hospitals. The schools excel in the spirit of research, and the hospitals are far ahead of ours in the care they give to their records.

SOME POINTS OF VIEW ABOUT VACCINATION.

EVERY week brings us a batch of newspaper cuttings about vaccination, and the recent circular issued by the Ministry of Health has not diminished their number. A short time ago (July 14th, p. 72) we discussed the duty of the medical profession in respect of vaccination propaganda in connexion with the appeal then recently made by the Bishop of Gloucester, and pointed out that the British Medical Association has constantly advocated a sound vaccination policy, has made representations on the necessity for more thorough vaccination of the community, has lent its support to suitable propaganda, and has supplied information to inquirers. Meanwhile, as we have frequently observed, small-pox is itself the best teacher. One of the reports before us is to the effect that the chairman of a board of guardians in Essex recently remarked at a meeting that "many people take exemption papers, and don't understand it," in which view he had the frank support of an opposing member, who said, "I did, but I don't quite know why." On the question of the need for revaccination, another guardian used the apt illustration, "though a house has once been repaired it has to be continually kept in order, so there must be revaccination." Ultimately it was resolved without a dissenting voice "that the attention of the doctors be called to the importance of vaccination, and that they should encourage parents and patients to be vaccinated." Thus are the clergy and the laity appealing to the medical profession to support vaccination. In the House of Commons a short time ago, as reported in our Parliamentary Notes at the time, a Labour member protested against the efforts of employers in Gloucester to get their employees vaccinated, and rhetorically asserted "that he declined to allow an employer of labour, simply because he employed an individual, to utilize powers that were never given to him to compel his employees to be vaccinated," and he "appealed to the Minister to come to the rescue of these people." Lord Eustace Percy, replying for the Minister of Health, said that were he in Gloucester he would claim the right to protect his household from what he would consider a risk, by refusing to take into his employment anyone who was not vaccinated. It would be a rather gross form of tyranny, he continued, were the State to tell him that he was not at liberty to do so. This rejoinder reminds us of a piece of evidence given by an American witness before the Royal Commission on Vaccination. He told how when small-pox was feared the officials of a certain State would board an immigrant train before it reached that State and proceed to vaccinate the travellers. When, as occasionally happened, an English immigrant objected, a conversation somewhat to the following effect would ensue: "I understand that vaccination is voluntary in this country." "Yes, certainly, this is a free country, stranger, you can be vaccinated or not as you please." This elicited the reply, "Well, I object to vaccination and I won't be done," to which the answer, "That's all right, we'll stop the train and let you off at the boundary of our State"; but, says the immigrant, "I don't want to be put off—I'm going into your State." "No, you're not, sir; you are a free man and refuse vaccination; we are a free State and refuse to admit the unvaccinated." "Well, what town do you let me off at?" "No town at all—there's none near the border. Oh! you *do* want to get vaccinated?—surely—which arm? Thank you—next please." That is not exactly the story, but only the gist of it, and similarly the Ministry of Health holds that the employer, as well as the employee, is a free man. Thus the great Republic of America and the conservative Government of Britain seem to hold identical views; whilst the American Eagle, the bird of freedom, winks to the British Lion, as they jointly witness this display of international agreement.

THE WORK OF A MATERNITY DEPARTMENT.

A CLINICAL report for 1922 of the maternity department of the Jessop Hospital for Women, Sheffield, has been prepared by Dr. J. Eric Stacey, the registrar. The total number of cases treated by the hospital during the year was 887; of these, 700 were treated in the wards; of the 618 delivered in the wards 203 were primiparae and 415 multiparae; primiparae are not attended in the "district." The maternal mortality was 14 (2 per cent.); 67 patients were discharged undelivered. The number treated in their own homes was 187. The hospital admits cases from the outlying districts, and no case has been refused during the year where application has been made by a medical practitioner. Many of such cases have been sent in after attempts at delivery in their own homes have been unsuccessful. The maternal morbidity (including the 14 deaths), calculated on the basis of deliveries (618) and not on the admissions, was 7.9 per cent. British Medical Association standard and 16.6 per cent. Queen Charlotte's Hospital standard. Among the 618 deliveries there were 11 cases of twins, 33 breech presentations, 10 transverse lies, 14 prolapse of funis, and 10 face and brow. There were 25 cases of placenta praevia, with no maternal death; 10 of the children were stillborn; there were 16 cases of accidental haemorrhage, including 4 of the concealed type, in one of which latter, where delivery was effected by Caesarean section, the mother succumbed; 9 of the children were stillborn. Out of the 147 cases of contracted pelvis treated in the hospital, 27 were delivered by forceps, 22 by Caesarean section, 7 by craniotomy, 2 by decapitation, 4 by version, and in 2 cases labour was induced; 21 children were stillborn. Caesarean section was performed on 33 occasions with 2 maternal deaths (the case of concealed accidental haemorrhage noted above and a face presentation who later died of sepsis). In 2 cases of concealed accidental haemorrhage delivered by this method the child was stillborn; 15 cases of eclampsia were admitted, and 4 of the mothers died. The deaths among the 629 children (including premature infants) born in the hospital numbered 95; of these 46 full-term children and 24 premature infants were born dead, the remaining 5 died after birth. No account is taken in the report of those cases of ectopic gestation, abortion, hydatid mole, hyperemesis gravidarum, and other complications of pregnancy in which the gestation period was less than seven months, as cases in this category are treated in the gynaecological wards of the hospital. A short summary is, however, given of the operations performed in the gynaecological department.

THE MODERN CONCEPTION OF JAUNDICE.

IN a recent leading article (August 25th, p. 333) based on Dr. J. W. McNee's critical review in the *Quarterly Journal of Medicine* of the recent advances in our knowledge of jaundice, attention was drawn to Dr. McNee's classification. This was into (1) obstructive hepatic jaundice, (2) toxic and infective hepatic jaundice, and (3) haemolytic jaundice. In our article the word "hepatic" was unfortunately omitted, thus weakening the contrast which it is so desirable to emphasize between, on the one hand, the first two forms, in which, as the old phraseology "hepatogenous" indicated, the liver is responsible, and, on the other hand, the haemolytic form in which, after excessive blood destruction, an exaggerated amount of bile pigment is manufactured by the reticulo-endothelial cells, quite independently of the glandular cells of the liver, and circulates in the blood, very probably not passing through the glandular cells of the liver at any time. While it is true that obstructive and toxic infective jaundice are commonly so spoken of, Dr. McNee's classification is an advance by the addition of the adjective "hepatic," and the distinction thus brought into constant prominence at the small expense of another three-syllabled word.

THE MEDICAL SOCIETY OF LONDON.

THE new session of the Medical Society of London will begin on Monday, October 8th, when at 8.30 p.m. the president, Dr. Herbert Spencer, will give an address on some of the changes in obstetric practice which have occurred since the foundation of the society. On the evening of November 12th a discussion on constipation, its causes, results, and treatment from the general practitioner's point of view, will be initiated by Dr. H. Des Voeux. On November 26th a discussion on the treatment of acute suppurative general peritonitis will be opened by Mr. Sampson Handley, and on December 10th Dr. Eardley Holland and Dr. H. Charles Cameron will introduce the subject of intracranial haemorrhage in newborn children, its pathology, effects, treatment, and results. There will be a clinical evening on October 22nd. The Lettsomian lectures will be delivered by Dr. R. A. Young in the early spring; he has taken for his subject the treatment of pulmonary tuberculosis. The annual oration will be delivered in May by Mr. Wilfred Trotter, M.S., F.R.C.S.

SIR HUMPHRY ROLLESTON, K.C.B., President of the Royal College of Physicians of London, will deliver the inaugural address at the opening of the London (Royal Free Hospital) School of Medicine for Women on Monday, October 1st, at 3.30 p.m. The subject of his address is the problem of success for medical women.

THE Japanese Embassy has issued a statement showing that the Japanese Red Cross Society got to work very quickly after the recent earthquake and fires, in spite of the fact that its head office was burnt down. A temporary office was established in a suburb of Tokyo, and the staffs of all the branches throughout the country, as well as those in Manchuria and Korea, were mobilized. By September 14th it had 53 detachments at work, and this number was shortly increased to 65. A sum of half a million sterling was placed at its disposal, and temporary barracks for the accommodation of the houseless have been established in Tokyo and Yokohama. The society is alive to the risk of epidemic outbreaks, and is organizing mobile relief columns and setting up centres for the detection of cases, the transport of patients, and the carrying out of measures of disinfection and sanitation. The number of refugees assisted in the Tokyo district down to September 12th was 42,000. The branches in Osaka and Kobe have opened relief centres, which deal daily with 10,000 refugees.

THE BRITISH ASSOCIATION.

NINETY-FIRST ANNUAL MEETING.

Liverpool, September 12th–18th.

INAUGURAL MEETING.

THE inaugural meeting, at which the President, Sir Ernest Rutherford, delivered the address, an account of which was published last week (p. 474), was held in the Philharmonic Hall, which was crowded by an attentive audience. Arrangements had been made to broadcast the proceedings for those unable to obtain seats. The Lord Mayor welcomed the Association to Liverpool and referred to the last meeting there in 1886, when the president was Sir Joseph Lister. Vice-Chancellor Dr. J. G. Adami, F.R.S., speaking on behalf of the University, referred in graceful terms to the connexion of the retiring president, Sir Charles S. Sherrington, with Liverpool, and the brilliant work he had done as professor of physiology, work which had brought him the highest honours, including the presidency of that Association and of the Royal Society. Sir Charles Sherrington introduced the new president, who illustrated his address by lantern slides. In proposing a vote of thanks to him, Sir Oliver Lodge mentioned that while Sir Ernest Rutherford had alluded to the work of others, he had said very little of what he had himself done to add to the knowledge of the constitution of the atom. The vote of thanks was seconded by Dr. E. H. Griffiths, F.R.S., formerly principal of the University College of South Wales and Monmouthshire, and carried by acclamation.

The thirteen sections began their work on September 13th.

PHYSIOLOGY.

In the Section of Physiology the president, Professor G. H. F. Nuttall, F.R.S., delivered an address on symbiosis in animals and plants. He gave a summary review of the present position of the subject under the two heads, dealing first with plants. He spoke of symbiosis in lichens and passed on to root-nodules of leguminous and other plants, dealing at some length with mycorhiza in orchids. He then mentioned the experiments of Molliard and Magrou with potatoes, which appeared to show that the manner of the production of tubers of the common potato was in accord with the view of Bernard that tuberization is due to the association of fungi with plants. Passing on then to animals, he spoke first of the physiological relations between animals and symbiotic algae, and then dealt with symbiosis in insects and discussed the mode of transmission of intracellular symbionts of insects. Speaking of micro-organisms in relation to luminescence in animals, he said that the host might be invaded by luminescent pathogenic bacteria, but that symbiotic bacteria were present in various light-emitting animals. The luminous organs in glow-worms consisted of parenchyma cells crowded with minute bodies having bacteria-like staining reactions; they were present also in the beetle's egg, which is luminous. In conclusion he said:

> The term "symbiosis" denotes a condition of conjoint life existing between different organisms that in a varying degree are benefited by the partnership. The term "symbiont," strictly speaking, applies equally to the partners; it has, however, come to be used also in a restricted sense as meaning the microscopic member or members of the partnership in contradistinction to the physically larger partners which are conveniently termed the "hosts" in conformity with parasitological usage.
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> The condition of life defined as symbiosis may be regarded as balancing between two extremes—complete immunity and deadly infective disease. A condition of perfect symbiosis or balance is realized with comparative rarity because of the many difficulties of its establishment in organisms that are either capable of living independently or are incapable of resisting the invasion of organisms imperfectly adapted to communal life. In these respects the conclusions of Bernard and Magrou in relation to plants apply equally to animals. It is difficult to imagine that symbiosis originated otherwise than through a preliminary stage of parasitism on the part of one or other of the associated organisms, the conflict between them in the course of time ending in mutual adaptation. It is, indeed, probable that some supposed symbionts may prove to be parasites on further investigation.
>
> In perfect symbiosis the associated organisms are completely adapted to a life in common. In parasitism the degree of adaptation varies greatly; it may approach symbiotic conditions on the one hand, or range to vanishing point on the other by leading to

the death of the organism that is invaded by a highly pathogenic animal or vegetable disease agent. There is no definite boundary between symbiosis and parasitism. The factors governing immunity from symbionts or parasites are essentially the same.

The summary he had given, Professor Nuttall continued, was sufficient to show that symbiosis was by no means so rare a phenomenon as was formerly supposed. It occurred frequently among animals and plants. The symbionts (algae, fungi, bacteria) became in some cases permanent intracellular inhabitants of their hosts, and were at times transmitted from host to host hereditarily. It was, he said, evident that we were on the threshold of further discoveries and that a wide field of fruitful research was open to those who entered upon it. In conclusion, he expressed the hope that British workers would take a more active part in the elucidation of the interesting biological problems raised by the study of symbiosis and the allied subject of parasitism.

In a paper in this section Professor J. Martin Beattie (Liverpool) discussed the action of finely divided particles of slate on toxins. The dust with which he experimented was derived from the Penrhyn slate quarries at Bethesda. The resident medical officer, Dr. J. Bradley Hughes, as a result of his clinical observations had arrived at the conclusion that the slate dust was not as such harmful to the quarrymen, and further that when pulmonary phthisis made its appearance other factors unconnected with slate quarrying were constantly present. Professor Beattie showed that an injection of powdered slate and diphtheria toxin was harmless to a guinea-pig, while the toxin alone speedily proved fatal.

Dr. S. Monckton Copeman read a paper on diet and cancer. One of his conclusions was that a dietary deficient in fat-soluble vitamin A in suitable cases of cancer prolonged life and eased the concomitant suffering. He counselled the avoidance of fresh meat, eggs, and cream, and the increased consumption of lettuce, watercress, vegetables, and fish.

Psychology.

In the Section of Psychology, Professor T. H. Pear read a paper on imagery and mentality. He insisted on the importance of realizing that the thinking processes in different persons might employ different vehicles and proceed along different routes. Hence the ability and also the disability that may accompany the mental life of the individual devoted to the use of one vehicle. The mentality of most persons was seriously affected by their predominant imagery. The visualizer sometimes used the verbilizer's ways. The visualizer could not easily remember the sound of a symphony, but could readily remember the conductor's appearance. The musician's remembered world was of sounds, and his thoughts, as expressed in imagery, were quite different, and it seemed impossible that the visile and the audile could be talking really of the same worlds.

Zoology.

Professor Ashworth, D.Sc., president of the Section of Zoology, delivered an address on modern zoology, some of its developments and its bearings on human welfare. He drew attention to the vast amount of research undertaken in recent years to elucidate two of the great problems of biology: the structural basis of heredity and the nuclear mechanism correlated with sex. The relation of insects, helminths, and protozoa to man was reviewed by the lecturer in a masterly fashion, and he paid a tribute to Liverpool workers, who have recently established the fact that the more common intestinal protozoa occurred indigenously in Great Britain. Of the seventeen kinds of protozoa found in the intestine of man, that associated with amoebic dysentery had been especially studied. Living as a tissue parasite in the wall of the large intestine as long as regeneration of the mucosa prevailed over the damage produced by the amoeba, no disease arose, but once this balance was disturbed in the destructive direction amoebic dysentery appeared. Professor Ashworth emphasized the importance of zoology to medical students, and suggested that a first year course of zoology and a course on entomology and parasitology about the third year should be part of their curriculum. Professor Dendy touched upon the amount of general zoology a medical student should acquire and enlivened the audience by relating a student's trick about a specimen. Mr. Julian S. Huxley read a paper on experiments with frog and newt ova. Twin newts had been produced from one egg by tying a hair round it at a certain stage of its segmentation.

Geography.

In the Section of Geography Dr. Vaughan Cornish, F.R.S., delivered an address on the geographical position of the British Empire. He emphasized the importance of maintaining an increase in the population of Great Britain, the surplus of which was sorely needed for the development of the Dominions beyond the seas. He deprecated the eugenic and ethical arguments and said that the ideal of a family of four children should be cherished by all Britons about to enter matrimony. The professional classes were not sufficient in themselves to maintain the supply of original genius. This had to be replenished from a very large reservoir of population, including those poorer classes upon whom the desirability of birth restriction was nowadays so insistently impressed. The geographical position of these isles supported his view that our race should increase and occupy the dominions of the British Empire and that the question of over-population did not arise. Dr. Cornish's counsel to us was to increase and multiply.

Geology.

Professor P. G. H. Boswell enlivened a discussion in the Section of Geology with a picture taken from *Punch* thrown on the screen, showing a prehistoric monster in the act of stamping the sand with its foot. The lecturer was discussing the famous footprints discovered in the Storeton quarries. That the Romans strangely ignored the existence of the Mersey estuary, of which Ptolemy's map had no trace, was explained by Sir Aubrey Strahan. He suggested that political and geographical reasons were the cause of this oversight on the part of the ancient cartographer. Professor Kendal added an additional reason that the Lancashire area was worthless to the Romans, whereas the rich lead mines of Flint made Chester a port of great importance to them.

Chemical, Physics, and Engineering.

The Chemical, Physics, and Engineering Sections united their forces to attack the problem of cohesion and molecular forces. Sir Oliver Lodge facetiously remarked that it was a remarkable event that three sections of the British Association should meet to find out the reason why, when we picked up one end of a stick, the rest of the stick came up too.

Social Events.

The social event of the week was the civic reception by the Lord Mayor and Lady Mayoress at the Art Gallery on September 13th. The whole suite of rooms, Art Gallery, Reference Library, and Museum were thrown open, and some 2,000 guests, including distinguished visitors from overseas and foreign countries, enjoyed the city's hospitality and the opportunity of seeing some of the city's valued treasures. The Art Gallery was especially thronged, and there the City Constabulary Band played an excellent programme of music. Many a renewal of former friendships took place, and the early connexion of many professors and lecturers in the various sections with the University of Liverpool recalled pleasant memories of bygone days. Refreshments were served in several of the rooms, and the convenience of the guests was ensured by the Lord Mayor, who had thoughtfully invited members of the Arts, Library, and Museum Committees to act as stewards on this memorable occasion. Excursions were made to numerous factories and places of interest in the vicinity of Liverpool. The visits to the liners were eagerly sought for, and those to the *Franconia* and the *Adriatic* were greatly in demand.

Future Meetings.

The British Association, which has paid several visits to Canada in previous years, will meet next year in Toronto in September, under the presidency of Major-General Sir David Bruce, K.C.B., F.R.S., F.R.C.P. Excursions to the West will be arranged before the meeting. In 1925 it will meet at Southampton.

THE STATE OF THE PUBLIC HEALTH.

SIR GEORGE NEWMAN'S REPORT FOR 1922.

[First Notice.]

THE annual report, just issued, of the Chief Medical Officer of the Ministry of Health for 1922[1] is characterized by the breadth of view and interest of narrative which its author has led his readers to expect in these annual surveys of the health of the nation. It differs from the annual report of the Ministry of Health, already reviewed (BRITISH MEDICAL JOURNAL, September 8th, 1923, p. 431), in its note of individuality, and by the emphasis laid on the medical aspects of the problems dealt with.

Sir George Newman points out that though it is only the fourth report under the Ministry, it is the sixty-fifth of the series which was begun by Sir John Simon under the Privy Council and carried on by his successors under the Local Government Board. The sources of information have extended, and now include the census reports, the Registrar-General's returns, reports concerning the National Health Insurance Acts, reports by medical officers of health and school medical officers, and special reports of various Government departments connected with the physical, industrial, and social welfare of the people. It is well that an effort should be made to collate in a single volume the general outcome of all such contributions to the common subject of the state of the public health.

INFANTILE MORTALITY.

It is gratifying to be told that the minimum decennial national rate of infant mortality—100 per annum under 1 year of age per 1,000 births in 1911-20—has been improved in the lustrum 1918-22, the successive rates being 97, 89, 80, 83, and 77; if the 100 rate for the decennium be divided into two periods of five years it is seen to be composed of 110 for 1911-15, and 90 for 1916-20. That is a very heartening statistical commencement to the volume, and is only very partially to be accounted for by the fall in the birth rate. Also, the very refractory death rate under four weeks of age begins at last to show some slight indication of coming under control, the figure for 1922 being 34 per 1,000 births, the lowest yet recorded. The high infant death rate of illegitimate children is very notable; it is close on double that of the legitimate. The cool wet summer of 1922 was no doubt in part, though by no means wholly, responsible for the very low mortality rate of 6.2 per 1,000 births from diarrhoea and enteritis under 2 years of age. It is argued that the record low infant mortality rate from all causes implies also a better physical condition in children from 1 to 5, as a high rate in the first year of life means the maiming of many children.

MATERNITY AND CHILD WELFARE.

Maternity and child welfare work was well maintained during the year, but without much further development. Unfortunately the deaths of women in childbirth show no diminution corresponding with that which has taken place in infantile mortality; in fact, little improvement has taken place since 1900, when the deaths were 4.81 per 1,000 births, which compared approximately with 3.81 in 1922. There has indeed been practically no improvement since 1894. In 1922, of the 2,971 deaths in childbirth 1,079 were attributed to puerperal fever, "a preventable condition." Puerperal albuminuria and convulsions caused 556 deaths, puerperal haemorrhage 390, and other accidents of childbirth 304; the number of cases of puerperal embolism and sudden death was 242, and those attributed to other accidents of pregnancy 136; abortion was responsible for 92 deaths, ectopic gestation 86, and phlegmasia alba dolens 54. The competence and responsibility of doctors, midwives, and maternity nurses is briefly referred to, also the value of ante-natal centres, and the pre-natal duties of doctors and midwives in private practice, especially as to urine testing. Notified stillbirths amount to about 3 per 100 live births, but the record is believed to be incomplete.

A list is given of 15 towns with unsatisfactory figures in connexion with maternal or infant mortality or stillbirths. Other subjects dealt with are supervision of the child from 2 to 5 years of age, and infant welfare centres, which now number 1,946; there are 465 under county councils, 783 under local sanitary authorities, and 698 voluntary. The figures indicate a satisfactory increase.

CANCER.

The recorded death rate from cancer is now more than seven times what it was in 1838; the increase has been very rapid at all ages since 1851, but especially in the older age groups, and it has been more rapid in males than in females, so that now there is very little difference between the sexes, women's rate having remained almost stationary in recent years excepting at the oldest ages. More than a third of the deaths of women are due to growths in the breast and uterus, and nearly a third of male deaths to malignant disease of the stomach and intestines. The declining birth rate may be an influence in the former. Dr. Stevenson showed in 1913 that from uterine cancer married women had a 73 per cent. higher mortality than the unmarried, but that in cancer of the breast the unmarried mortality was 45 per cent. greater than the married. On this question of sex incidence Sir George Newman writes:

> "Contrasting broadly the features of the mortality from cancer in the two sexes, two conclusions are clear. The first is that local predisposition, whether in itself or combined with local stimulation, is an element of the first importance in the etiology of malignant disease. The second is that the action of some general outstanding economic or social factor common to both sexes, such, for example, as the ingredients of a national diet, though apparently involved, must be very indirect and its final resultant profoundly modified by local organic peculiarities."

The question whether the recorded increase of cancer is real or is largely "paper" is next discussed. The arguments for the latter view are, first, that many more people now live to reach the cancer age, and second, that improvement in diagnosis has added to the recorded deaths. The conclusion reached is that "the recorded increase of mortality from cancer is not a statistical fiction but an established fact," though it does not follow that the whole increase is real. Nor is the increase confined to this country. It extends to Holland, the United States, Australia, Italy, and Japan, as shown by an American investigator in 1915; in short, "the recorded mortality from cancer is increasing throughout the world," excepting perhaps in Switzerland, where it seems to have become stationary.

Victory over cancer, it is held, can only be achieved by persistent investigation, by observation, and differentiation. Chronic or prolonged "irritation," in the widest interpretation of the term, of epithelial cells by chemical, physical, or infective agents is now generally accepted as a cardinal factor. The importance of early resort to treatment is insisted on, whether by operation, *x* rays, radium, or diathermy. The Cancer Committee of the Ministry is engaged in many inquiries on the subject, and investigation is taking an international form.

TUBERCULOSIS.

Tuberculosis, as befits its importance, is treated at considerable length. Taking phthisis and non-pulmonary tuberculosis together, it is found that decreased mortality from the latter balances some increase in the former, so that the total deaths per million of population were 1,121 in 1922, against 1,127 in 1921, and 1,131 in 1920. These totals, though practically stationary for the three years, are decidedly lower than any earlier figures. Passing by the excessive mortality of the war years, the deaths from phthisis numbered 38,422 in 1911, and 33,919 in 1922, while the deaths from other forms of tubercle fell from 14,698 in 1911 to 8,858 in 1922. The slight rise in phthisis deaths within the past three years may perhaps be due to unemployment interfering with nutrition, but the decline in non-pulmonary forms has continued steadily since 1917.

[1] *The State of the Public Health.* Annual Report of the Chief Medical Officer of the Ministry of Health for the year 1922. H.M. Stationery Offices. (Med. 8vo, pp. 186. Price 2s. 6d.)

In *notifications* there has been no break in the diminution even of pulmonary cases since 1918. The following paragraph, which we quote in full, amounts to a serious criticism both of clinical practitioner and medical officer of health.

"There has been further evidence during the year that notification is still incomplete and delayed. In one area the average number of deaths from pulmonary tuberculosis during the five years 1917-21 was 59.2, yet during that period the average number of primary notifications was only 60.6. In one year, out of 55 deaths in that area, 26 cases had not been notified prior to death. With regard to non-pulmonary tuberculosis the case was worse, the average number of deaths being 13.2 per annum, whilst the average number of primary notifications was only 7.8. Yet the Medical Officer of Health was under the impression, until his attention was directed to the figures, that notification was well carried out in his district. It is to be regretted that the full co-ordination which is desirable between the tuberculosis officer and the general practitioner has not yet been attained."

Village Settlements and Training Colonies.

The difficulties here are discussed sympathetically and frankly. It is concluded that no attempt should as a rule be made to change any but an occupation which cannot be made reasonably suitable; that if change is essential great regard should be had to physical and temperamental capacity and to the prospect of ultimate settlement of the patient in his new calling; that care committees should take active interest in settlement arrangements; and that highly competent trainers should be employed to give courses of the nature of intensified apprenticeship. Agricultural work, though frequently desired by ex-service men, is not generally suitable nor likely to yield a livelihood. The critical time comes when the man tries to make a living.

The central fund for the purpose of helping ex-service men is undertaking experimentally the settlement of a group of trained men who would not otherwise find employment, and who, it is hoped, when they have acquired necessary speed in production, may be established as self-supporting workers, with a market found for their goods.

A NOTE ON MEDICAL PRACTICE IN NORTH AMERICA.

BY

H. CECIL H. BULL, M.B., M.R.C.P.,

RESIDENT ASSISTANT PHYSICIAN, ST. GEORGE'S HOSPITAL.

In the United States and Canada it is becoming increasingly difficult to persuade doctors to go into country practice. The medical graduate of to-day has come through a long and expensive course. He is trained in bacteriology, pathology, and biochemistry, and is accustomed to the use of a variety of expensive instruments. Without them he feels inadequate. Moreover, the practice of a country physician does not frequently call for elaborate diagnosis. The modern graduate going into country practice feels intellectually starved, and prefers instead to set up in the city where his income may be less but his environment is right, and where he is in touch with laboratories, a medical library, and a medical society. It is for this reason that the medical curriculum is sometimes criticized for being too extensive, in the sense that the long course of training is not one which fits the average man for country practice, where his services are most demanded.

The American student of a "Grade A" university is required to study Arts for three years and medicine and surgery for four, after which time he is presumed qualified to sit for his examinations, but a further year as resident in a hospital is necessary before he is admitted to the degree of M.D. He does not enjoy the same personal contact with patients as we do. Teaching over the living subject is confined to ward rounds. Dressings and simple laboratory examinations are done by the residents and nurses. Success in examinations is not so much a matter of chance as it is in Great Britain. The pace of the class is that of the slowest member, and especial attention is paid to the backward student. As long as the student has attended his classes and carried out the prescribed formula he is reasonably sure to pass at the end of his term. This system is open to criticism according to our standards, but it is designed to achieve a higher general average.

Medical training and post-graduate study are particularly well organized at the Toronto University Medical College under the direction of Dr. Graham, University Professor of Medicine. The buildings of the university and the Toronto General Hospital are very fine, the laboratories are modern and spacious and are fitted with every necessity and many luxuries for routine examination, teaching, and research.

The student's course is outlined for him up to the end of his graduation and interneship. After that he may serve as a paid assistant and take a course for a number of years in the different laboratories. Later he may obtain a post as part-time assistant while he begins to develop his private practice outside.

This system is thorough, but invites some criticism. The student, who has been on the hospital staff through all his post-graduate training, has been accustomed to have everything he desires—and more than most doctors dream of—always at hand. He is well informed, but his self-reliance has been little exercised, and he is not prepared to face the disabilities of practice in the country. This is a problem of medical education which is exercising the minds of the university professors of North America.

Doctors, even in the smaller towns of the United States, try to keep up to date in medicine and surgery. Their journals are more numerous and more read than are the journals in Britain, as also are the foreign publications, particularly the British and the German. Every town has its local medical society, whose meetings are well attended; papers are read and discussed, and subsequently published in the monthly State journal. Medical science is not advancing at a pace to warrant so much literature, but these papers stimulate local interest and bring a certain amount of publicity to the authors. Many men, particularly in the West and Middle West, leave their practices for a fortnight each year and travel—perhaps 6,000 miles—to and from a medical conference. At these meetings a great many papers are read, and new instruments and equipment exhibited; but probably the most valuable stimulus is derived from personal contact with others.

The American specialist performs many elaborate tests, but the sum of evidence in terms of benefit to the patient is not large. The specialist is conscientious and wishes to leave no path unexplored, hence the enormous number of tests and modifications. The feelings of the patient and the expense incurred are not always balanced against the possible sum of information to be derived. Many of the tests are tedious, their interpretation depends on the personal factor, and their value in many cases is doubtful. It seems to the onlooker that there is a lack of judgement in this wholesale performance. But when the whole procedure is completed the doctor can honestly say he finds no evidence of disease, if he feels so inclined; or, since the human machine is rarely found in a state of perfection, he can attribute all the symptoms to defective teeth or tonsils, organs which, perhaps by reason of their accessibility to instrumental examination, are too often incriminated when the diagnosis is obscure.

Americans are particularly good technicians, hence their natural love of instrumental examinations and tests of all sorts. Their *x*-ray work is good, and *x*-ray diagnosis is considered essential to examinations of the chest, abdomen, and bones. Nearly every doctor has a small *x*-ray outfit in his consulting room, partly for self-protection, because a patient will often sue his doctor when dissatisfied with the result of a fracture, and the doctor is almost sure to lose the suit if he has no *x*-ray picture of the part.

Patients are notoriously unfaithful to their doctors. Over and over again when I asked a patient who his doctor was I would be given a list of several in the same city whom he had consulted in turn. In this way patients gain a curious insight into medical matters and methods, but they are often bewildered. Doctors are considered fair game in the lawcourts. Dissatisfied patients frequently sue them for negligence, and as often as not win their case. Many doctors, of course, prefer to settle out of court to avoid publicity and the expense of a legal action—a shyness for the limelight which the public recognizes and to some extent trades upon.

Included in the list of men and women practitioners whom the patient has visited there is usually an osteopath or a chiropractor, unqualified medically, but graduated from special colleges in manipulative exercises and assuming the title of Doctor. Their methods are well known. They appeal because they promise speedy cure for all ailments by a few dramatic manipulative effects. The patient experiences relief in proportion to the faith he has in the treatment, and as most of the patients are suffering with some form of hysteria or nervous exhaustion they frequently show temporary improvement and declare that the chiropractor is a better man than the doctor. He is certainly an opportunist, as he studies the psychology of the patient, and he collects a good income in small fees on a cash basis. The chiropractor and osteopath advertise widely,

and into their net falls the credulous public, which dearly loves theatrical effects even if a little suspicious of the performer's integrity.

"*Group Medicine.*"

The "group system," founded by the Mayo brothers of Rochester, Minnesota, has largely modified the practice of medicine and surgery in North America, and may eventually do so throughout the world. The name of Mayo—well known in medical circles—is famous in every city, village, and homestead in the United States and Canada. The town of Rochester, with a population of 15,000, is known in five continents, and bears out the truth of the quotation from Emerson—a favourite one in the Mayo Clinic—"If a man can write a better book, preach a better sermon, or make a better mousetrap than his fellow men, though he build his house in the woods, the world will beat a highway right to his door."

Briefly, a "group" consists of a physician, surgeon, radiologist, specialists in diseases of the eyes, ears, nose, and throat, and a staff of laboratory workers. To this nucleus individual specialists may be added from time to time as the practice increases. All the work of diagnosis is carried out under one roof, but operative work is performed in a hospital or private nursing home.

Every patient is examined physically, the history is taken, and all laboratory tests are performed within the building. Every patient is seen by at least two physicians, each of which writes down his individual opinion. A case requiring special knowledge is seen by a specialist in that branch. Every surgical case is completely examined before operation, and determination of the functional efficiency of the heart and kidneys is made, so that, besides establishing the diagnosis, an estimation is made of the operative and post-operative risk.

There are certain advantages and disadvantages in "group" practice. For the patient it may be said that the group offers better value at smaller cost than individual practitioners and specialists. Owing to the saving in overhead expenses it is possible for a "group" to demand a smaller fee than would be paid for visits to several specialists in independent consulting rooms.

The doctor in a group works on a system, which alone is a great time-saver; moreover, he is relieved of bookkeeping and filing of records, and to some extent of his correspondence. His clinic is a complete unit, and not only does he get his laboratory reports quickly, but he can spend some time himself in the laboratories, refreshing his memory and familiarizing himself with recent developments. He can at all times discuss cases with a colleague whose knowledge in one special branch is greater than his own. He has more time for reading and opportunity for research, and when he goes away for special study to one of the larger cities—as he should for a period in every year—the practice is able to carry on without him, and his salary continues.

The disadvantages of a group system apply both to patient and doctor. The latter, if he joins a group early and without experience in general practice, is likely to become a narrow specialist in his own sphere and to lose the broader outlook.

Routine is good, and is essential to the smooth running of a big institution; but, as is often seen in the out-patient department of a big hospital, an institution may become the slave of its own system. It is the same in "group" clinics. The personal factor is easily neglected, and the patients come to feel they are being regarded as "cases" and numbers rather than as human beings.

Following the success of the Mayo Clinic, "groups" have sprung up in various cities in the United States and Canada. Many of these are prospering, some have failed. It is difficult to analyse the cause of failure, but it seems always to be preceded by internal discord. A "group" is essentially communistic. Personality is lost sight of in the achievement of the whole, and it is only a certain type of mind that is willing to sink individuality for the common good of all.

"Groups" must do big business to cover expenditure, and at the present time they are to be found only in the larger cities.

"Group clinics" are not popular in university towns. They are felt to be in opposition to the universities, to the men on their staffs, and to the graduates who leave to take up individual practice. In the same way they are sometimes resented by country practitioners, whose wealthy patients may be drawn away to well known clinics to have more thorough examination than the individual country physician is capable of; mostly, however, these clinics are found to be working in friendly co-operation with the general practitioners.

The Battle Creek Sanitarium.

At Battle Creek, in the State of Michigan, there is a medical institution—"sanitarium" so called—which caters for the jaded business man, the mental wreck, and the chronic dyspeptic, besides any cases of organic disease which may come to the clinic. The institution was founded in a modest way by followers of the Seventh Day Adventist faith many years ago. From the time of its foundation to the present day it has grown immensely in size and wealth, and has moved away from the religion but still retains one of the tenets of the faith—vegetarianism. Vegetarianism is not part of the creed of the faith, but it is included in the doctrine of "right living," together with excommunication of tobacco, alcohol, and stimulating beverages such as tea and coffee.

Battle Creek Sanitarium can accommodate about 600 patients, and it is popular among well-to-do Americans. Exercise, simple food, and regular hours are the principles of the institution. There is a large and well organized staff of doctors. Each patient on admission is examined, and a programme of treatment is drawn up to suit the particular case and correct the disease. In the basement of the main building there is a physiotherapy gymnasium equipped with every known variety of vibrator and massage appliance, and on the floor above there are various kinds of baths with a large staff of attendant masseuses. A routine which provides healthy occupation for the mind and body throughout the day is prescribed for each patient. In the morning baths and exercises are taken; in the afternoon gymnastics, a walk, or a game of golf; in the evening after dinner there is club swinging and a march round to music, followed by a lecture or concert. Smoking is prohibited, and everyone goes early to bed.

The Battle Creek Sanitarium authorities believe in the Metchnikoff theory of intestinal intoxication. They hold that a vegetarian diet is the natural diet of man, that *B. acidophilus* and other fermentative bacteria of the same group are the normal flora of the intestine, and that toxaemia follows on absorption of the products of protein putrefaction. Accordingly the diet is an important factor in treatment. Especial attention is paid to cleanliness in the kitchens, on the top floor of the building, where the food is prepared almost without handling and the fruits are washed in antiseptics. The institution has its own market garden, chicken farm, and herd of dairy cattle. The milk and butter are sterilized, and the butter is salt-free. A good deal of the milk is reinoculated with a pure culture of *B. acidophilus*, and is kept on ice when curdled. Every patient has a stool examination on admission, and a somewhat crude estimate is made of the relative numbers of putrefactive and fermentative colonies. Further examinations are made from time to time until there is a satisfactory preponderance of colonies of the *B. acidophilus* group. But a vegetarian diet alone is not always enough to foster the growth of this delicate organism. In some cases it is necessary to add to the diet dextrin and maltose, which leave an undigested residue in the colon suitable for the growth of *B. acidophilus*. Other patients take cultures by the mouth, and many drink the fermented milk with their meals. For obstinate cases, or to save time, resort is had to colon irrigations and high enemas impregnated with living cultures.

All hospitals in North America employ one or more dietitians—girls trained in food values and preparations—who calculate the respective food properties and supervise the individual patients' diets according to general instructions from their physicians. Battle Creek, besides employing a number of girl dietitians, has a large dietetic training school of its own, which is highly esteemed and which sends out graduate dietitians all over the continent. Each patient at the sanitarium is in charge of a dietitian. The menu card is a long list of foods, with the weight, the calorie, protein, fat, and carbohydrate value of each item shown on the margin. The dietitian indicates on the card the dishes she has selected for her patient, and the card is left on the table for the patient to see and discuss with the dietitian if he wishes to do so. The dietitian acts under the instructions of the physician, who changes the diet from time to time as the case continues under observation. Patients invariably leave the sanitarium well satisfied and in good health. Many return year after year for rest and treatment. It is a matter for conjecture how much of the good effect is due to the carbohydrate diet and the *B. acidophilus*, and whether it is not all due to the healthful influence of a well ordered life; for a holiday of rest in quiet surroundings with simple food, exercise, early hours, and suppression of stimulants will benefit the neurasthenic patient apart from any other influence.

The routine of Battle Creek is designed to repair the damage done to shaken nerves by the wear and tear of civilized life, but this care of the neurasthenic, while the greatest, is only one side of the sanitarium's activity. An increasing amount of surgery is done, and the deep-therapy *x*-ray section, under the direction of Dr. James T. Case, is of the best in America. Careful examination of the patients on admission separates patients with functional from those with organic diseases, and the latter receive appropriate treatment while participating as far as possible in the general routine.

England and Wales.

DR. ADOLPH BRONNER OF BRADFORD.

Dr. ADOLPH BRONNER, who recently retired from the position of honorary surgeon to the Royal Eye and Ear Hospital, Bradford, a post he had held for over thirty-four years, was on September 13th the recipient of a presentation from a number of subscribers. The ceremony was held in the Council Chamber and the presentation was made by the Lord Mayor, who said that Dr. Bronner belonged to a family noted not only for its skill in surgery and the ophthalmic art, but for its association with philanthropic movements over a long period. Dr. Bronner, in returning thanks, said that the hospital was founded in 1857 by his father and Mr. Jacob Behrens. In 1885, when he joined the hospital staff, there were 2,700 in-patients and 224 operations; in 1922 there were 8,500 in-patients and 1,427 operations; in addition 2,100 spectacles were supplied to patients. He had no fear for the future of the hospital. Public opinion was very much against municipalization; it was chiefly in favour with a few medical officers of health, who wanted to municipalize the whole of the medical services. He was certain that the Ministry of Health was not in favour of municipalization, but hoped that medical officers would work in a friendly spirit with those who conducted existing hospitals. A remedy for the difficulties of voluntary hospitals would, he thought, be found if in-patients who could afford it paid something towards their maintenance. The Royal Eye and Ear Hospital was an absolute necessity in Bradford, and no one need have any fear in leaving money to it. The presentation consisted of two travelling bags and a gold cigarette case. A tablet recording Dr. Bronner's services has been placed in the hospital, where there is also a tablet in honour of his father, and with the surplus, which was handed to Dr. Bronner, he proposes to buy something which will be useful to the hospital. The spokesman for the subscribers said that the gifts carried with them the personal regard they felt for Dr. Bronner and their appreciation of the work he had done.

CARE COMMITTEES FOR CONSUMPTIVES IN LANCASHIRE.

The annual reports of the Care Committees for Consumptives of Farnworth and District, Westhoughton, Leigh and District, and Wigan County Districts, show that all of them have carried out their work very successfully during the past year. These care committees have been formed, with the approval of the Lancashire County Council, to supplement the medical treatment provided by the County Council for persons suffering from pulmonary tuberculosis. The committees assist in the purchase of the outfit of clothing which patients need when they go to a sanatorium or hospital; they provide food and clothes for poor persons who are receiving treatment at home; they provide, on loan, bedding for patients to enable them to sleep alone; they assist dependants, as a little timely help may enable the breadwinner to give up work in the early stages of disease, when the prospects of arrest and cure are still good; they visit patients and their families and give them friendly advice; they assist in finding suitable work for patients who have sufficiently recovered; and they endeavour to enlighten the public upon the laws of health and the facilities that exist for the treatment of tuberculosis. The importance of this work has long been recognized by those responsible for the treatment of tuberculosis, for while treatment is now provided by the local authorities supplementary assistance is often necessary, on account of the economic problems involved, in order that the medical treatment may be adequately carried out. These committees include representatives of the various local authorities, war pensions committees, trade and labour councils and trade unions, maternity and child welfare societies, approved societies and co-operative societies, and similar organizations, as well as the local medical officers of health and sanitary officials. They are financed by voluntary subscriptions and by grants from the Lancashire County Council and certain other public bodies. They deserve increased public support in the important work they are doing in the campaign against tuberculosis.

Scotland.

THE HEALTH OF GLASGOW.

THE extent and variety of work involved in the health administration of a great city are well shown in the course of the 180 foolscap pages of Dr. A. K. Chalmers's report on Glasgow for 1922. It covers all the important subjects falling within the sphere of a modern medical officer of health—population, vital statistics, maternity and child welfare, infectious, respiratory, and venereal diseases, hospitals, offensive trades, housing, bacteriological laboratory, general sanitation, and the work of a port local authority.

Dr. Chalmers does not accept the Registrar-General's estimate of the population of Glasgow, but works on the figure of 1,081,983, instead of 1,037,800, but even so the rate of increase is much less than in previous decennia. The death rate for 1922 was 16.5, and the birth rate 26.2. The death rate is 2 per 1,000 above that for 1921, owing to prevalence of measles, influenzal pneumonia, bronchitis, and the other respiratory diseases. That from measles alone exceeded the previous year's rate by more than one per 1,000 of the population, and if the other diseases mentioned be taken as a group, they, along with measles and influenza, show a total excess of 2,704 per 1,000 over 1921, or considerably more than the total difference between the two years.

Going back over the three years 1920-21-22, it is shown in the report that Glasgow has had a higher death rate than Edinburgh, Dundee, and Aberdeen in Scotland, and than London, Liverpool, Manchester, and Birmingham in England. Taking the average of rates (not a perfect statistical method, but sufficient for the purpose) for the three years, it appears from the data that the mean Glasgow death rate at all ages was 15.9, Edinburgh 14.3, Dundee 15.4, Aberdeen 15.1, Liverpool 15.0, Manchester 13.8, London 12.8, and Birmingham 12.0.

Dr. Chalmers notes that the fall in infant mortality during the present century is in marked contrast with its relative immobility during the whole period of sanitary activity in the last century, and he points out that the whole of the infant mortality and child welfare movement has arisen during this period. He next goes on frankly to show that in death rates at all ages from 1860 onwards, Scotland has not done so well as England and Wales, the following being the figures for successive decennia:

	1861–70	1871–80	1881–90	1891–1900	1901–10	1911–2
England and Wales ...	21	20	19	18	15	14
Scotland	22	22	19	19	17	15

Proceeding to contrast the infant mortality of the two countries, the results are even less satisfactory in respect of rate of decrease in Scotland. It thus appears that

Per 1,000 Births.	1861–70	1871–80	1881–90	1891–1900	1901–10	1911–2
England and Wales ...	154	149	142	153	128	100
Scotland	121	123	119	128	116	105

though Scotland has, nearly all through the sixty years, a higher rate for all ages than England and Wales, yet the difference now is only 1 per 1,000, just as it was in the first decade of the table. In infant mortality, however, England and Wales has done much better than Scotland. England and Wales has had a drop of 35 per cent., while Scotland has diminished by only 17 per cent., so that England and Wales, which in 1861-70 had 154 deaths

for every 121 in Scotland, had in 1911-20 only 100 deaths for every 106 in Scotland, this being the first decennium in which it has achieved a lower rate. Limiting the comparison to the last twenty years, the fall in England and Wales has been 24 per cent., and in Scotland 17 per cent. In commenting on these figures Dr. Chalmers remarks that in Scotland the death rates at all ages, and for infants alone, have decreased in equal amounts, whereas in England and Wales the infant rate has diminished to a much greater extent than the others; the difference between the two countries would be accounted for, say, by the reduction of infantile diarrhoea in England and Wales, while there is no evidence of any corresponding change in Scotland. Turning to Glasgow, he points out first that deaths from immaturity—under four weeks of age—have proved absolutely refractory to administrative effort, and the problem is being investigated as a whole by the Medical Research Council, part of the inquiry being carried on in Glasgow. Comparing 1903-7 with 1918-22, the death rate under three months shows no change, but from three to six months it has diminished by a third. For the whole first year of life the decrease from all causes has been 5 per cent., and has been specially great in tuberculous diseases (67 per cent.), diseases of the nervous system (54 per cent.), digestive disorders (36 per cent.), measles, whooping-cough, and scarlet fever (25 per cent.), and respiratory diseases (10 per cent.); a change in nomenclature is partly responsible for some of the figures. One satisfactory feature of the Glasgow statistics is that if, from 1903 to 1922, they be broken up into five-year groups, there is a steady fall of deaths of infants under one year, the successive rates being 135, 129, 128, and 110 per 1,000 births.

Some of Dr. Chalmers's very interesting statistics are referred to elsewhere (p. 528) in this issue.

Ireland.

DOWN COUNTY ASYLUM: THE NEW SPIRIT IN PSYCHIATRY.

IN his annual report for 1922, Dr. M. J. Nolan, the resident medical superintendent, has an interesting paragraph headed "Desiderata." In this he refers to the hope expressed by him in his previous report, that matters affecting lunacy administration and allied problems might be dealt with speedily by the Government of Northern Ireland. Since then, he remarks, the Mother of Parliaments has heard much on the subject, and the impetus thus given cannot be long disregarded in the Six County area, whose population will naturally look for the improved conditions which will very soon be in operation in England. But even in present circumstances, he says, much can be done and is being done to accelerate the cure of the recoverable, and render more happy and useful the lives of the chronic insane. The classification of the patients, their dietary, clothing, personal freedom, occupation and amusements, are all subjects of constant attention with increasingly good results. Dr. Nolan concludes with this striking passage:

"It has recently been observed, of the type of insanity which has changed so markedly within one's memory, that the change is due not to the varying nature of insanity itself, but to its more humane and sympathetic treatment. That such is really the case is very near the mark. Visitors to asylums whose previous knowledge of the insane is derived from fiction, and from exaggerated sensational reports in the press, express wonderment, and in some instances show an ill-concealed disappointment that the lunatics are, as a rule, well ordered, passive persons, exhibiting none of the mad antics and bizarre appearances which they were led to expect. This is the happy result of modern methods of treatment."

New Zealand.

PUBLIC HEALTH IN 1922-23.

THE report for the year ended March 31st, 1923, of the New Zealand Department of Health, shows that the standardized death rate of the Dominion fell from 10.93 per 1,000 in the previous year, to 10.70. The infant mortality rate also—41.9 per 1,000 births—compares very favourably with the rate of 77 provisionally announced for England and Wales in 1922. In his general survey of vital statistics, the Director-General of Health, Dr. T. H. A. Valintine, remarks that "the population of New Zealand has the greatest expectation of life of any of the leading countries of the world; and, apart from social and economic factors, it is not unreasonable to assume that this is in some measure due to the many activities of this department." The death rate of cancer was 8.52 per 10,000 persons living, and that of tuberculosis 6.5. Much useful propaganda work, covering many phases of preventive medicine, was carried out by officers of the department, and appreciation is expressed for the addresses and health talks given by members of the British Medical Association and the New Zealand Dental Association, by departmental officers, and by authorities on architecture and town-planning. An exhibition of hygiene was held in Wellington, and at other centres the medical officers of health and school medical officers associated themselves with health campaigns within their districts.

Dental Caries.

The report on school hygiene draws attention to the great prevalence of dental decay in children throughout the Dominion. Dr. R. J. R. Mecredy, who devoted special attention to the recording of dental decay, found over 90 per cent. of children with caries, from which it is inferred that a dentist examining with probe and mirror would undoubtedly have found a still higher percentage. The number of carious teeth found in different schools throws some interesting light on the causes of dental decay. Dr. Mecredy says: "The relationship of dental caries to the store (confectioner's shop) is indicated by the greater number of carious and treated teeth per head in schools near a store. The actual ratio is as 100 in schools near a store to 73.5 in the schools remote from a store. The amount of caries is therefore over 25 per cent. less in the latter schools. It would appear from these figures that the store, which mainly sells sweets and biscuits to the children, is therefore responsible for a quarter of the dental caries found in schools."

The Medical Board.

Passing to another section of the report, we find a note on the work carried out during the year by the Medical Board, established under the Medical Practitioners Act, 1914. Four meetings were held during the year and a large part of the work was concerned with inquiries into charges of misconduct made against medical practitioners. An analysis of the New Zealand Medical Register shows that the total number of names of registered practitioners has mounted slowly from 969 at the end of 1917 to 1,073 at the end of 1922. The population of New Zealand at the census in April, 1921, was 1,218,913, exclusive of Maoris, who numbered 52,751. The number of births registered last year was just over 29,000, being the second highest ever recorded, but the birth rate was, with one exception, the lowest.

Maori Hygiene.

Dr. Te Rangi Hiroa, Director of the Division of Maori Hygiene, makes a separate report on this subject. He records that the health generally of the native people showed improvement, and this he attributes to the activities of the Maori Health Councils, co-operating under the guidance of native nurses and inspectors. As the European population grows the Maori becomes relatively sparser and sparser; in 1891 there were 14.9 Europeans to one Maori; the proportion is now approximately 24 to one. But the risk of extinction of Maoris by an excessive preponderance of males, which at one time seemed imminent, now shows signs of disappearing.

SEVERAL deaths from bubonic plague are reported to have occurred among the Spanish troops in the Melilla zone, on the north coast of Morocco.

THE Medico-Chirurgical Society of Bologna, founded by Francesco Orioli in 1823, will celebrate its centenary in December next.

Correspondence.

MINERS' NYSTAGMUS.

SIR,—The Second Report of the Miners' Nystagmus Committee (Special Report Series No. 80) is chiefly the work of Mr. Pooley and is a very valuable contribution to an important subject. I think it is incontestable that the determining etiological factor is defective illumination, but at the same time there may well be other factors, for all persons who are exposed to defective illumination do not take nystagmus and it affects those that take the malady very differently, some taking it severely and others only slightly. Undoubtedly if proper illumination of mines is going to abolish all miners' nystagmus, then the question of secondary causes becomes one of slight importance; indeed, such causes become negligible.

The report referred to is very thorough and is, from a practical point of view, very suggestive. Perhaps it might have thrown some light on what, for convenience, we may call the hidden etiological factors, if Mr. Pooley had been able to investigate the condition of the Wassermann reaction in a sufficient number of cases to give him reliable data. Do a larger number of persons with a positive Wassermann reaction suffer more severely from miners' nystagmus than an equal number of persons similarly placed who have a negative Wassermann reaction? I was brought up on the view, that very often in tertiary or congenital syphilis the light sense is markedly defective. A feeble illumination *plus* a defective light sense may be more disastrous than a feeble illumination alone. Of course, the difficulties in the way of carrying out such an investigation are very great. To begin with, the consent of the men would require to be obtained, and that is not likely to be granted when the investigation is not obviously to be productive of improvement. Further, there would arise the question, in the event of a distinct connexion between a positive Wassermann reaction and miners' nystagmus being proved, of compensation for a disease of venereal origin. Personally I do not think that such an investigation is feasible.

Years ago I suggested that on first employment a miner's eyesight should be examined and carefully noted. Such an examination should undoubtedly include an examination of the light sense. I would be inclined, *prima facie*, to prevent a man with a defective light sense being employed below ground, at any rate at the face, but I would scarcely reject him for any other ocular defect. Certainly, as is pointed out in the report under discussion, a miner can work with a very low degree of visual acuteness. At the Toronto meeting of the British Medical Association (1906) I gave several instances of this. Elsewhere I have pointed out that manual work cannot be evaluated in terms of visual acuteness, but depends on what I call the form sense. Visual acuteness in the true sense of the term is a function of the macula and its neighbourhood. The form sense has always seemed to me to be intimately connected with the light sense and is a function of the entire visual field. It is much to be regretted that in certain textbooks the use of Snellen's or similar types is said to test the form sense. Such types test visual acuteness only and not the form sense.

Perhaps from the practical and economic point of view the most important parts of this excellent report are the classification given on page 17 and the other classification given on page 20. There is no reason why the latter should not be adopted as a standard and why it should not be the duty of the medical referee to say to which group each individual case belongs.

Again, the element of psycho-neurosis is a matter that claims attention. In not a few cases I have noted its presence in the notes which I have taken of such cases.

In conclusion, I would suggest that the classification given on page 20 be adopted and that the incapacity, and consequently the compensation, should be fixed with reference to that classification.

Another point to be remembered is that a man working underground may have nystagmus which is not miners' nystagmus. I once saw a miner who undoubtedly had nystagmus, but who also seemed to me to be suffering from disseminated sclerosis. As is pointed out in the report, nystagmus may be present but yet may not be the cause of the incapacity. An ophthalmic referee, however, would require to be very sure of his ground before coming to the conclusion that the incapacity was not primarily and chiefly due to the presence of nystagmus, and probably such cases should invariably also be seen by a physician well versed in neurological investigations.—I am, etc.,

Glasgow, Sept. 18th. FREELAND FERGUS.

SPIRITUAL HEALING.

SIR,—The suggestion put forward by Mr. Maylard in your issue of September 15th (p. 487) is well worthy of consideration. That such cures have been effected by the Rev. R. C. Griffith ought to be properly substantiated; the more so seeing that these statements were made from such a public place as Westminster Abbey, and have, in consequence, been widely spread through the agency of the press.

While many will be disposed to agree that spiritual good may result from the promulgation of such statements, many, on the other hand, will feel equally certain that harm may, and even will, result. May I, therefore, offer the suggestion that the three particular classes of cases which Mr. Griffith instanced in support of his supernatural contention—restoration of sight to the blind, the immediate recovery of a withered arm, and the curing of cancer cases in twenty minutes—be thoroughly investigated in the interests alike of the public and the profession—both clerical and medical—by a committee appointed by the Council of the British Medical Association.

The proposal made by "M.D." in the same issue of the JOURNAL, that the committee—presided over by a dignitary of the Church—which existed prior to the war to inquire into these presumed cases of spiritual healing should resume its investigations would not, I think, be so satisfactory nor so convincing as a committee appointed by a powerful Association like the British Medical, whose investigators would be men of such outstanding position in the profession that the all-important factor of diagnosis in these cases, prior to their supposed miraculous recovery, would receive that consideration which medical experts alone can give.—I am, etc.,

W. G. DUN, M.D.,
Glasgow, Sept. 17th. President R.F.P.S.G.

TESTS FOR DRUNKENNESS.

SIR,—This all-important subject, so well raised by Dr. Parry (September 15th, p. 487), is of great interest to-day on account of recent convictions for intoxication in motor drivers.

The Danish Medical Legal Society has set a good example to this country, as to my mind motor drivers should be on the same level as railway-engine drivers. It is imperative that a police-surgeon should not have a shadow of doubt if he as a witness certifies a man as drunk or in drink.

Many years ago I heard the late Dr. Lowndes, the chief police-surgeon of Liverpool, who had a life-long experience in that capacity, say, "A man is drunk when he is on the ground and is unable to get up without assistance"—that is, if he has been drinking and such diseases as apoplexy, etc., are excluded. Then, if that be so, the case is reduced to "Being in drink, or under the influence of drink."

In addition to the many excellent tests put forward by the Danish Medical Legal Society I should like to add an old one—as to whether the man can read the clock or watch correctly. All sense of time is invariably lost in alcoholism. The man will often say, "I have had no drink to-day of any kind"; then an emetic will tell the truth of his statement. No surgeon would be justified to certify drunkenness upon any one sign alone; they must be taken as a whole. The man's temperament should be taken into consideration, due allowance should be made for signs of agitation or nervousness which would be presented by the fact that he is in a police station and a charge may be brought against him. The surgeon could not do better than to imagine himself in a similar position. Some people in drink are excited and talk incessantly, while others are calm and collected.

The pupillary condition, described many years ago by

Sir William Macewen, is most reliable. The rectal temperature is a valuable test if other conditions are excluded. The reading of a sentence is, I think, unreliable; but to repeat such words as "mixed biscuits" say twenty times would be a guide, but some people cannot do this even sober. The smell of alcohol is positive, and the result of an emetic doubly so.

After an extensive examination into all the tests applicable, they should be summed up together, and, as before said, the surgeon, if in any doubt, is entitled to give his evidence as such and the defendant should in the ordinary course of justice receive the benefit of that doubt. I cannot help coming to the conclusion that police officers, excellent as they are in their work, are too often apt to jump to the conclusion that a man is in drink, and that is brought about by the fact that they are untrained in its similarities.—I am, etc.,

Chichester, Sept. 16th. ARTHUR M. BARFORD.

PERNICIOUS ANAEMIA.

SIR,—Much water has passed under the mill since Dr. Gordon Ward wrote to the JOURNAL under the above caption (May 19th, 1923), and doubtless Dr. Knyvett Gordon will have answered the questions then asked long ere this reaches you. May I also enter this discussion, not as a specialist but as a general country practitioner?

I would point out to begin with that the practitioner of to-day who proposes to make all his diagnoses and base his treatments on clinical evidence is refusing to avail himself of the modern tools of his profession. Such an one should do his rounds behind a cob because the unseemly speed and rattle of the motor car is subversive both of the dignity of the practitioner and of connected thought on the last or next case.

In the particular disease under discussion the blood film is so characteristic and so conclusive that every practitioner should be competent to make the diagnosis for himself; if, however, he lacks the requisite microscopic appliances or ability, he is not justified in failing to avail himself of the services of the nearest clinical laboratory.

Dr. Ward, however, makes a mischievous appeal "on behalf of the poor clinician" that writers shall be permitted to refer to a collection of diseases under one name—to wit, the grave anaemias under the name of one form, pernicious. It may be unfortunate that an adjective equally descriptive of several forms should have been applied specifically to one only. Had this form been termed "megaloblastic," then might it have been included also among the pernicious anaemias, of which all are agreed there are several forms. It is, however, too late to correct the nomenclature, and it must be used as it stands.

This being so, writers must surely conform to common usage and avoid ambiguity, otherwise they spoil much of the value of their work. Thus, for one compiling a review of recent contributions on "pernicious" anaemia, Dr. Coates's contribution needs the most careful dissection to avoid the inclusion of pernicious anaemias that are not megaloblastic.—I am, etc.,

H. LEIGHTON KESTEVEN, M.D.

Bullahdelah, New South Wales,
Aug. 7th.

EPITHELIOMA CONTAGIOSUM.

SIR,—With reference to my paper on the above subject which appeared in the JOURNAL of August 4th, I regret that the legends relating to Figs. 3 and 4 are transposed: that under Fig. 3 relates to Fig. 4 and that under Fig. 4 to Fig. 3.

In answer to the comment which appeared on page 214 of the same issue I would reply that the *ragi* referred to was a fine millet (*Eleusine coracana*); the *cholam* a coarse millet (*Sorghum vulgare*). The *dals* or *dhals* of India are legumes, which are allied to the European pea (*Cajanus indicus, Ervum lens* Linn., *Cicer arietinum* Linn., *Pisum sativum* Linn., *Phaseolus radiatus, Ph. mungo*, all belonging to the Leguminosae). An account of these tropical food materials will be found in the *Manual of Tropical Medicine*, by Castellani and Chambers, third edition, 1919, pp. 104 and 105).

It may be mentioned that since the above paper was written a second outbreak of epithelioma contagiosum has occurred at a time when 286 pigeons were under observation in my laboratory. Eighty-four of these birds were deficiently fed on a diet of autoclaved milled and polished rice *plus* 2 per cent. of their body weight of *ragi* (*Eleusine coracana*). Ten cases of epithelioma occurred among them, in two animal houses situated fifty yards apart, the cases appearing in six different cages. The remaining 202 birds included 97 controls fed on mixed grains; 48 birds fed on different varieties of unhusked rice (paddy); 9 birds fed on whole *ragi*; and 48 birds fed on mixed grains *plus* an excess of protein, or of sugar, or of lime, or of iodine, or of lime and iodine. No case of epithelioma contagiosum occurred among birds receiving a natural diet of mixed grains or of mixed grains to which an excess of the above substances was added. The state of faulty nutrition favourable to the operation of the invisible virus of this malady is brought about by deficiency of certain substances in the diet, among which vitamin B is one.—I am, etc.,

Pasteur Institute, Coonoor, Aug 28th. R. MCCARRISON.

ETHER *VERSUS* CHLOROFORM.

SIR,—Whether Mr. G. H. Colt is correct in his statement (BRITISH MEDICAL JOURNAL, September 8th, p. 438) that the correspondence on the above subject can be prolonged with advantage is doubtful, but some of his remarks tempt me to a brief reply. Although, like most of those who spend their time administering anaesthetics, I am firmly convinced that ether should be selected as a routine agent, I am as certain that there are many cases for which chloroform is preferable. When I am told by practitioners that they have never been taught to administer chloroform I think their course of instruction has been incomplete. Chloroform, although less safe than ether, is so much more convenient for the country practitioner and is so much easier to administer that no medical man should be lacking in knowledge of its use. But I would venture to differ strongly from Mr. Colt when he states that with ether "from the surgeon's point of view a really first-class high degree of muscular relaxation is seldom attained." My own opinion is that cases in which complete relaxation cannot be obtained with ether are relatively few and that many of them will prove equally resistant when changed on to chloroform.

When I remember Mr. Colt skilfully practising the art of anaesthesia before deserting it in favour of mere mechanical processes that "anyone of average ability and practice" can perform with "some degree of proficiency and speed" the technique of open ether was, as he admits, in its infancy. He does not appear to realize what great advances have since been made. Like some previous correspondents he bases his argument on what happened in cases that were not *under* any anaesthetic. One need not hesitate to claim that with open ether one can frequently obtain abdominal relaxation comparable to that of spinal analgesia. Unfortunately the administration of ether is somewhat more difficult than that of chloroform and renders the services of an experienced anaesthetist more necessary. This will be regarded as an advantage or otherwise according to the mentality of the surgeon. As to the other disadvantage of ether—the liability to bronchial trouble—I am sure this is often exaggerated. No competent anaesthetist will give ether to a patient liable to complications of this kind. The post-operative bronchitis is as often due to the work of the surgeon as to that of the anaesthetist. The patient with an abdominal wound often fails to ventilate his lungs sufficiently, with the result that bronchitis or hypostatic pneumonia may follow. I have on several occasions been accused of giving a patient ether bronchitis and upon investigation discovered that he or she was anaesthetized with chloroform by someone else. A house-surgeon recently called my attention to the fact that the out-patients operated upon, practically unprepared, and sent home again in a few hours, at all times of the year, never seem to contract the lung troubles that might be expected. Yet nearly all such patients are anaesthetized

with ether but none of them have abdominal or other operations likely to interfere with efficient respiration.

Mr. Colt's suggestion of a tonometer to measure muscular relaxation would, I fear, prove impracticable. I know few surgeons who would willingly attach one to their retractor and, of course, with good ether relaxation such an instrument may be unnecessary. If attached to a group of muscles at a distance the information would be of slight value, as if Mr. Colt will carry back his thoughts to those far-off anaesthetic days he will remember that relaxation in one set of muscles does not necessarily imply it in another. Many surgeons are themselves tonometers of excessive delicacy.—I am, etc.,

London, W., Sept. 11th. CHARLES F. HADFIELD.

PAY OF THE R.A.M.C.

SIR,—In the recent Educational Number of the BRITISH MEDICAL JOURNAL there appears, under the heading of Public Services, a lengthy notice concerning the pay for the Army Medical Services. This has doubtless been perused by many officers of the corps with astonishment, and probably also by would-be applicants with high hopes.

My reason for writing is to ask from what source these figures came, as they will be disputed by those officers already serving in the corps if they take the trouble to work out their incomes. Again, they can be disputed by the Army Estimates for the year 1923-24 printed on March 5th, 1923, which gives the total maximum for lieutenants up to major-generals. It will be seen at once that those given in the article in question do not in any case agree with those in the Army Estimates, which include all pay except specialist and extra duty pay.

I give the 1923-24 estimate:

	Married.	Unmarried.
	£	£
Lieutenant	598	532
Captain	738	646
Captain after 6 years	756	665
Captain after 10 years	811	719
Major	884	824
Major after 15 years	975	916
Lieut.-Colonel	1,157	1,107
Lieut.-Colonel after 20 years ...	1,203	1,153
Lieut.-Colonel after 25 years ...	1,249	1,198
Colonel	1,471	1,407
Major-General	2,140	2,074

I consider the article most misleading, especially as allowances have been lumped together with pay; this is contrary to the meaning of paragraph 272—Allowance Regulations, which states: "Lodging money is not a personal emolument"; if it is not personal, it cannot be regarded as income.

Again, all allowances of those drawing specialist pay are taxable where the specialist holds a fixed appointment, and as most specialists' appointments are now fixed he who should get 5s. a day only gets 2s. 1d. a day, and he who should get 2s. 6d. extra gets 5d. This also holds good for allowances in other cases where the appointment is considered by War Office to be of a fixed nature.

I enclose my card, but not for publication for obvious reasons.—I am, etc.,

September 8th. AN ARMY DOCTOR.

*** The information published was supplied to us by the War Office.

DR. V. NOQUET of Lille, one of the pioneers of laryngology, and President of the French Society of Oto-rhino-laryngology in 1901, has recently died at the age of 76.

WITH the proceeds of the "Golden Casket" lottery, which amount to some £200,000 per annum, maternity hospitals and ante-natal and child welfare clinics are to be established throughout Queensland, under the provisions of a new Maternity Act passed at the last session of the Queensland Parliament. Maternity hospitals will be established in isolated places, and sums varying from £2,500 to £10,000 will be used for the provision of adequate institutional accommodation in the ten largest towns of Queensland.

Obituary.

DR. ERNEST MORLEY ROOKE died at Brighton after an operation on September 10th, aged 57. He was the second son of the late Dr. T. M. Rooke of Cheltenham, and was educated at Guy's Hospital Medical School, and took the diplomas of L.S.A. in 1891 and M.R.C.S. and L.R.C.P. Lond. in 1892. He served as a civil surgeon in South Africa in 1899-1900, receiving the Queen's medal with two clasps; was for several years chief medical officer of the Bengal-Nagpur State Railway in India; and held a temporary commission in the R.A.M.C. in 1915-16. He was vice-chairman of the National Service Medical Board for Sussex.

DR. ALFRED GEORGE WILKINSON, a veteran practitioner, of Northampton, died on September 15th, aged 88. He took the diplomas of M.R.C.S.Eng. in 1857 and of L.S.A. in 1866. While still a student he went to the Crimea as a dresser, and worked with Florence Nightingale; he assisted in attending the wounded after the charge of the Light Brigade. Dr. Wilkinson settled in practice in Northampton in 1870, and he continued at work until a few days before his death.

DR. WILLIAM FLETCHER GIBB of Paisley died on September 11th, aged 67 years. He was the son of the late Mr. Andrew Dewar Gibb. From Paisley Grammar School he went to the University of Glasgow, where he graduated M.B., C.M. with commendation in 1883, and M.D. in 1885. He also studied in Vienna. He served as house-surgeon to the Western Infirmary, Glasgow, and assistant physician to the Glamorganshire County Asylum before commencing practice in Paisley. He had held the appointments of medical officer to the West Kilbride Convalescent Home, consulting surgeon to the Royal Alexandra Infirmary, Paisley, and certifying factory surgeon. When the war broke out Dr. Gibb deputized for other local medical practitioners who were called up for military duties, and he also gave daily service at the Bellahouston Hospital. His kindly manner inspired great confidence in his patients.

DR. JOHN MCMURRAY died at his residence in Bootle on September 12th, in his 66th year. He graduated M.D., R.U.I., M.Ch., and L.M. in 1882, and three years later took the degree of M.A.O. He was senior scholar in therapeutics and pathology at Queen's College, Belfast, in 1881-2, and obtained honours in his university examination. He was a justice of the peace for the borough of Bootle, and mayor of the borough in 1897-98. Dr. McMurray was visiting medical officer to the Liverpool Industrial Schools and the Liverpool branch workhouse, and had served as honorary surgeon to the Bootle Borough Hospital, senior resident medical officer to the Liverpool Parish Infirmary, and house-surgeon to the Northern Dispensary, Liverpool.

We regret to announce the death on September 17th of DR. MARGARET L. A. BOILEAU, aged 56. She was the only daughter of the late Sir Francis Boileau, received her medical education at the London School of Medicine for Women, and graduated M.B., B.S.Lond. in 1906. She afterwards served as clinical assistant in the out-patient department of the Elizabeth Garrett Anderson Hospital for Women and for some time was in practice at Ravenscourt Park. During the war she acted for a short time as house-surgeon at the Jenny Lind Hospital for Children. She was commandant of the V.A.D. Hospital at Swainsthorpe, and for several years during the war and subsequently she gave gratuitous assistance to the infant welfare clinics of the Norwich Corporation. She was a member of the East Norfolk Division of the British Medical Association. She took great interest in the Girl Guide movement, the work of the Church Missionary Society, and the Young Women's Christian Association.

The Services.

DEATHS IN THE SERVICES.

Surgeon Commander William Perceval Hingston, R.N., was killed, along with his wife, at Yokohama, in the great earthquake in Japan, which destroyed Yokohama and Tokyo, on September 1st. He received his medical education at the Middlesex Hospital, took the M.R.C.S. and L.R.C.P.Lond. in 1903, and after filling the post of house-physician at the Middlesex Hospital entered the Navy. He attained the rank of surgeon commander on March 1st, 1917.

Surgeon Commander Alec Bedingfeld Marsh, R.N., died at Haslar on September 7th, aged 46. He was the son of the late Henry Marsh, paymaster-in-chief, R.N., and was educated at Oxford (Merton College), where he graduated B.A. in 1899, and at Edinburgh, taking the Scottish triple qualification in 1903. After serving as assistant medical officer of the county asylum at Winwick, he entered the Navy in 1904, and became surgeon commander in June, 1917. He served along with the Prince of Wales on H.M.S. *Hindustan* and at the beginning of the late war was a shipmate of H.R.H. the Duke of York on H.M.S. *Collingwood*. Later he was on board H.M.S. *Dartmouth* when she was torpedoed in April, 1916, and afterwards served in the Royal Naval Air wing at Grantham. For the past two years he had filled the post of ear, nose, and throat specialist at the Royal Naval Hospital, Haslar. He made the observation that poison gas can produce fatal effects by entry through the ear, and invented an extension of the gas-mask to prevent such entrance. He acquired lung disease through exposure during the evacuation of Russian refugees in the Black Sea in 1919. He leaves a widow and two children.

Medical News.

THE Prince of Wales, who is Chancellor of the University of Wales, has promised to visit the University College of Wales at Aberystwyth on October 30th, when he will open a students' club.

THE annual dinner of the Cambridge Medical Society will be held in the hall of King's College, Cambridge, by kind permission of the Provost and Fellows on Saturday, September 29th, 1923, at 7.30 for 7.45. Tickets, price 15s., inclusive of wine, should be obtained before September 27th from Dr. G. S. Haynes, 58, Lensfield Road, Cambridge. A meeting of the society will be held at Addenbrooke's Hospital on Friday, October 5th, at 2.30 p.m. By arrangement, all members of the Cambridge and Huntingdon Branch of the British Medical Association are entitled to attend the meetings of the society, which are held monthly, except during August and September, and count as clinical meetings of the Association.

THE annual dinner of the West Kent Medico-Chirurgical Society will be held at the Trocadero Restaurant, Piccadilly Circus, London, W.1, at 7 for 7.30 p.m., on Thursday, October 4th. Applications for tickets should be addressed to Dr. C. J. B. Buchan (Hon. Sec.), 326, Brownhill Road, Catford, S.E.6.

THE tenth Norman Kerr memorial lecture of the Society for the Study of Inebriety will be delivered by Sir William Willcox, K.C.I.E., M.D., at the house of the Medical Society of London (11, Chandos Street, Cavendish Square, W.) on Tuesday, October 9th, at 4 p.m. The subject chosen is drug addiction.

THE National Hospital for the Paralysed and Epileptic has issued a syllabus of a post-graduate course to begin on October 8th and to continue until November 30th. After noon, each day will be pretty fully occupied by lectures and demonstrations on the pathology of the nervous system, by attendance at out-patient clinics, and by clinical lectures and demonstrations. Members attending the course will be entitled to witness operations. The inclusive fee will be 7 guineas, but any part of the course may be taken separately. Full particulars can be obtained from Dr. C. M. Hinds Howell, dean of the Medical School, at the hospital (Queen Square, Bloomsbury, W.C.1).

A POST-GRADUATE course will be held as usual this year at the Radcliffe Infirmary, Oxford; it will last from October 1st to 6th. There will be clinics and demonstrations each morning, and two sessions of one and a half hours during each afternoon. A detailed programme is being prepared and will be obtainable from either of the honorary secretaries, Dr. W. T. Collier or Mr. Hugh Whitelocke, at the Infirmary.

THE Home Secretary has made a Regulation, dated September 10th, empowering port medical officers to issue certificates to masters of foreign ships authorizing them to obtain, within certain limits, preparations containing opium, cocaine, morphine, or heroin which are required to complete the necessary medical equipment of the ship. These certificates when presented are to be treated by the supplying chemist in a similar way to prescriptions given by a doctor to a patient.

AS a result of the appeal for the British Empire Cancer Campaign nearly £55,000 has now reached the offices of the British Red Cross Society at 19, Berkeley Street, W.1. More than half the total number of subscriptions have been anonymous. The fund at its inception received an anonymous gift of £20,000. There has been also one anonymous gift of £2,000, two of £1,000, three of £500, and many others of smaller amounts, which bring the total of anonymous subscriptions to £28,000. This is held to indicate that a great many of the supporters of the campaign are sufferers or relatives of sufferers from the scourge.

THE opening meeting of the North-East London Clinical Society will be held on Thursday, October 4th, at 4.15 p.m., when Dr. G. F. Still will give a lecture on common errors of diagnosis in diseases of children; the president, Dr. A. J. Whiting, will be in the chair. The annual dinner of the society will take place at the Prince of Wales's Hospital, Tottenham, on October 11th, at 8 p.m.

DR. R. ANTOINETTE MCF. SCOTT has been presented by the Women's Guild of the Parish Church, Laurencekirk, with a writing case and a wallet of Treasury notes on the occasion of her departure for I'Chang, China, where she will take up duty in the Buchanan Memorial Hospital.

THE annual dinner of past and present students of University College Hospital will be held on Friday, October 5th, at the Hotel Cecil, Strand. Tickets (price 12s. 6d.) can be obtained from Mr. Gwynne Williams and Dr. T. R. Elliott at University College Hospital Medical School.

A WILLIAM FARR lecture, on the measurement of progress in public health, will be given by Sir Arthur Newsholme, K.C.B., M.D., on Thursday, October 4th, at 5 p.m., at the London School of Economics and Political Science (Houghton Street, Aldwych, W.C.2). The lecture is open to the public without fee.

THE Advisory Committee on Industrial Hygiene, which has just ended its sittings at the International Labour Office of the League of Nations at Geneva, adopted a resolution stating that the most effective method of securing the success of research into the prevention of anthrax would be the constitution of national committees to work under the general direction of the Health Committee of the League of Nations. Members might with advantage be appointed after consultation between the Health Committee of the League of Nations and the Government departments in each country which are responsible for the administration of the Factory Acts. Dr. Smyth, assistant professor of industrial hygiene at Pennsylvania University, described his method of iodine disinfection to the committee, which expressed the hope that his observations would be followed up. The committee also discussed the possibility of sterilization of the effluents of tanneries.

DR. STEPHAN VON APATHY, professor of zoology at the University of Kolosvár, who was well known for investigations on neuro-histology, recently died at the age of 60.

THE Society of Public Analysts will resume its monthly meetings on October 3rd. The society meets in the rooms of the Chemical Society, Burlington House, at 8 o'clock on each evening.

DR. C. E. LAY of Peasenhall has, on the occasion of his retiring after forty-two years' practice in the district, been presented by the parishioners of Badingham, Bruisyard, Heveningham, Huntingfield, Peasenhall, and Sibton, with a silver tray, suitably inscribed.

THE report for 1922-23 of the Professional Classes Aid Council, upon which the British Medical Association is represented by Dr. G. E. Haslip, shows that useful work continues to be done by this organization, which exists in order to assist in relieving distress among the professional and educated classes and their dependants. It does more than merely make grants of money, its aim being to enable the recipient of assistance to become independent of further help. During the year the council dealt with 533 new applicants (of whom 127 were, however, not within the scope of the organization and 22 were otherwise unsatisfactory) and 89 old applicants (of whom 32 had similarly to be refused). In addition, 50 families received assistance in providing education. The expenditure for the year amounted to £7,334, showing a deficit of £2,213, and an appeal is therefore made for increased financial support. The offices of the council are at 251, Brompton Road, S.W.3.

THE London School of Tropical Medicine has arranged to send an expedition to Samoa to study the prevention of elephantiasis and filariasis, diseases which affect 85 per cent. of the inhabitants of the Samoan group. The expedition will have its headquarters at Apia and will be away for two years; it will work in co-operation with the New Zealand Government, which is responsible for the administration of Samoa. The expedition, which will leave this country on November 15th, will be under the leadership of Dr. Patrick Buxton, who did valuable work on entomology in Mesopotamia during the war, and has recently been entomologist to the Palestine Government at Jerusalem.

Letters, Notes, and Answers.

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.*

CORRESPONDENTS who wish notice to be taken of their communications should authenticate them with their names—of course not necessarily for publication.

As, owing to printing difficulties, the JOURNAL *must be sent to press earlier than hitherto, it is essential that communications intended for the current issue should be received by the first post on Tuesday, and lengthy documents on Monday.*

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C.2, on receipt of proof.

IN order to avoid delay, it is particularly requested that ALL letters on the editorial business of the JOURNAL be addressed to the Editor at the Office of the JOURNAL.

THE postal address of the BRITISH MEDICAL ASSOCIATION and BRITISH MEDICAL JOURNAL is 429, Strand, London, W.C.2. The telegraphic addresses are:

1. EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology Westrand, London;* telephone, 2630, Gerrard.
2. FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westrand, London;* telephone, 2630, Gerrard.
3. MEDICAL SECRETARY, *Mediocra Westrand, London;* telephone, 2630, Gerrard. The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin;* telephone, 4737, Dublin), and of the Scottish Office, 6, Rutland Square, Edinburgh (telegrams: *Associate, Edinburgh;* telephone, 4361, Central).

QUERIES AND ANSWERS.

"MEDICUS" asks for references to the treatment of periodic dipsomania and alcoholism by psychotherapy.

CLEARING THE THROAT.

"L." asks for suggestions in the treatment of a medical man, aged about 45, who suffers from continual attempts at "clearing of the throat" owing to undue secretion of mucus in the larynx. It is increased in cold damp weather and on dusty roads, lessened (or entirely absent) when lying down in bed. The condition makes talking a trouble and an exertion, and it much interferes with the strength and tone of the voice. During an actual attack of acute laryngitis there is no desire to "clear the throat"; only when the acute stage has passed off does it recur.

SYMPATHETIC MAGIC?

WITH reference to the note under this heading (September 15th, p. 490), in which a correspondent stated that he had been asked whether stuffing a pad of cotton-wool into the mother's umbilicus would kill the child by suffocation, Dr. M. Cursham Corner (Mile End Road, London, E.) writes: I think the condition or sentiment arises from the common idea in this neighbourhood of wearing a pad of sheep's wool tied in a bandage so as to fit over the umbilicus; the reason given to me by the mothers is to keep the infant warm.

TYPHUS AND TRENCH FEVERS AND THE LOUSE.

PASCAL.—The wording of our correspondent's inquiry as to the method of transmission of typhus fever and trench fever by lice is not quite clear. If it refers to the life-history of the parasite in the louse, there is no evidence at present to show the nature of any micro-organism that is the cause of trench fever; and doubt is being thrown on the theory that the so-called Rickettsia bodies found in typhus fever, and regarded as protozoal in character, are actually living organisms or a causative factor in that disease. If the inquiry refers to the mode of transmission from lice to man, this is the same for both diseases—namely, by the excreta of infected lice being rubbed into excoriations of the skin which are caused by scratching. It is only the body louse (*Pediculus vestimentorum*), and not the *Pediculus capitis* or *Pediculus pubis*, that is implicated. Infestation by the body louse occurs mainly through close association with verminous persons, especially when men sleep close together, but it may occur indirectly through clothes, bedding, combs, brushes, and other effects used by lousy individuals. Full information on the subject will be found in vol. ii, *Hygiene of the War*, chapter XII, of the series of volumes on the Medical History of the War, and also in chapters V and XVI of vol. i, *Diseases of the War*, of the same series. No fresh light has been thrown on the facts recorded in these volumes.

LETTERS, NOTES, ETC.

A COUNTRY practitioner sends us the following couplet, headed Metabolism, Past and Present:

"Banting took our flesh away;
Banting brings it back to-day."

HERPES AND VARICELLA.

DR. M. T. D. MCMURRICH (Johnstone Bridge, Lockerbie) writes: In view of the supposed relationship between herpes and varicella the following case may be of interest. On August 22nd a man, aged 71, had an attack of herpes affecting the posterior surface of the pinna of the right ear and the angle of the jaw (the area corresponding to the distribution of the nervus auricularis magnus). On August 28th he developed chicken-pox, which ran a normal course. On September 11th his niece, aged 9 years, who lives with him, also developed chicken-pox. The fact that chicken-pox developed in a man over 70 years of age who was already suffering from herpes, seems to give support to the view that herpes and varicella are due to a common causal factor.

CONGENITAL DEFORMITY.

DR. JOHN WALKER (Paisley) writes to inform us of an exceptional case of birth that came under his notice. On September 4th, 1923, a woman was delivered of a female child having little or no vestiges of arms or legs. Of the right arm there was only a small portion of the humerus, and of the left arm even less. The right leg was completely absent, revealing only a slight projecting rotundity; but the left leg, in a similar shrunken state, took the form of a foot with but two toes appearing, the great toe and the next adjoining—and having no sign of thigh or leg. The head, neck, and trunk were perfectly normal and the child cried, sucked, passed meconium and urine, and has already lived eleven days, showing signs of natural development. The labour was a breech case; in birth the cord was cut before delivery of head, and no artificial respiration applied, yet the child survived. Dr. Walker adds: "The birth has been followed with keen interest, both by myself and assistant doctors and professors in the West of Scotland. It seems to me an extraordinary case, both in regard to the infant's early and vigorous vitality, as also to the supreme extent of deformity. I would be glad to get details regarding any similar cases, as also data of their later development."

A DISCLAIMER.

DR. E. ROWLAND FOTHERGILL (Hove) writes: My attention has been drawn to certain advertisements appearing in the JOURNAL for September 15th. This advertisement includes the phrase "Put your faith in a Fothergill," and I am asked "Are you breaking out in a new place?" Apart from the fact that any direct descendant of the Fothergills from Ravenstonedale, Westmorland, is bound to break out sooner or later somewhere—it being heredity—I would be glad of the opportunity to say I know nothing whatever about the advertisement nor the firm advertising. In support of this contention I would draw your attention to the word "a" in the quoted paragraph; an introduction into an otherwise complete sentence which I am sure you will agree those who know me would consider unnecessary, not to say disparaging, in its possible interpretation.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 33, 36, and 37 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 34 and 35.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page *140*.

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Advertisements should be delivered, addressed to the Manager, 429, Strand, London, W.C.2, not later than the first post on Tuesday morning preceding publication, and, if not paid for at the time, should be accompanied by a reference.

NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.